

# **Appendix A**

**Letter dated May 24, 2002 from John H. Roburtus,  
California Regional Water Quality Control Board to  
Donald Weaver, Duke Energy South Bay**

## **California Regional Water Quality Control Board**

San Diego Region

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Phone (858) 467-2952 FAX (858) S71-6972

May 24, 2002

**CERTIFIED-RETURN RECEIPT REQUESTED  
7099 3220 0005 6494 7328**

Mr. Donald Weaver  
Plant Manager  
Duke Energy South Bay, LLC  
990 Bay Blvd.  
Chula Vista, CA 91911

Dear Mr. Weaver:

### **REQUEST PURSUANT TO CWC 13267 FOR STUDIES TO ASSESS THE IMPACT OF INTAKE STRUCTURES, AND DISCHARGE FROM SOUTH BAY POWER PLANT ON SOUTH SAN DIEGO BAY**

On May 4, 2001, Duke Energy submitted an application for renewal of NPDES Permit No. CA0001368. Order No. 96-05 expired on November 14, 2001. Tentative Order No. 2001-283, renewing the NPDES permit for Duke Energy, South Bay Power Plant (SBPP), was initially Considered by the Regional Board at a public hearing on December 12, 2001. During the December 12, 2001 public hearing the Regional Board heard oral testimony, but decided to delay action on the tentative Order until a future meeting.

Staff considered all written and oral testimony provided by the public and various environmental resource agencies regarding tentative Order No. 2001-283. The tentative Order was assigned a new Order number (No. R9-2002-0022) and incorporated a number of revisions based on comments received prior to and during the December 12, 2001 hearing. Tentative Order (No. R92002-0022) also included additional monitoring requirements and special studies necessary to fully assess the impacts of the South Bay Power Plant discharge on the ecosystem in south San Diego Bay. Tentative Order No. R9-2002-0022 was mailed out for public comment on March 22, 2002

Based on a review of additional ambient water quality data for south San Diego Bay and further consultations with resource and regulatory agencies, including the U.S. Fish and Wildlife Service, the California Department of Fish and Game, and the U.S. EPA, staff has concluded that that previous studies conducted by the discharger to assess the impact of the intake structures and discharge on water quality objectives and the designated beneficial uses of south San Diego Bay and verification of compliance with Sections 316 (a) and 316 (b) of the CWA do not fully represent existing conditions in south San Diego Bay and operational parameters at SBPP. Because of the need for current data, the Regional Board will defer consideration of a reissued permit to a future date.

Pursuant to Section 13267, I am directing Duke Energy to conduct six studies to assess the impact of the intake structures and the discharge from, the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay and to verify compliance with Sections 316(a) and 316(b) of the Clean Water Act (CWA). The critical issues and rationale for conducting these studies is included in Section

A of this letter. The descriptions of the six required studies are included in Section B of this letter. The schedule for the planning, initiation, and completion of the studies and the timelines for submittal of the associated work plans, progress reports, and final technical reports are detailed in Section C of this letter.

## **A. CRITICAL ISSUES**

### **A.1 Compliance with Section 316(a) of the Clean Water Act (CWA)**

Section 316(a) of the CWA requires that States impose an effluent limitation with respect to the thermal component of a discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of receiving water.

In 1972-73 a thermal effects study was completed, on behalf of the discharger, to investigate compliance with the State Thermal Plan and CWA Section 316(a). Evidence from both intertidal and subtidal sampling suggested that elevated water temperatures caused by the thermal discharge had adverse impacts to bay organisms that inhabited the cooling water discharge channel, particularly in late summer and early autumn. These effects were much reduced during the winter and spring periods when ambient water temperature dropped and the temperature of the thermal plume reduced. During all seasons, however, the adverse effects appeared to be confined, primarily to the inner portions of the discharge channel. The overall finding was that the thermal effluent from the SBPP had no major adverse effects on the benthic communities beyond the end of the discharge channel.

Subsequent thermal effects studies and monitoring conducted by various environmental and research entities have confirmed the initial studies conducted in 1972-73 by Ford & Chambers.

In 1995 the USEPA reviewed 18 years (1977-94) of annual summer benthic studies and concluded that although the benthic community in the discharge channel typically contains somewhat reduced diversity and abundance of species, the community present there is within the range observed at sampling stations outside the discharge channel, and there have been no appreciable long term upward or downward trends in species diversity or abundance. In 1996 the Regional Board concurred with USEPA's review of the benthic community study and findings of previous Section 316(a) compliance investigation studies. The Regional Board adopted Order No. 96-05 in November 19, 1996, renewing the NPDES permit for SBPP and finding the discharger to be in compliance with Section 316(a) at that time.

Although the permitted thermal limits in effect at the time the previous 316(a) studies were conducted have not changed, the compliance point used for verification with thermal limits was relocated in Order No. 96-05.

A jetty extends from the northern side of the SBPP discharge basin into San Diego Bay, separating the inlet and discharge channels. The width of the SBPP discharge channel varies from approximately 100 feet (at the property line) to approximately 1,200 feet at its widest point in the Bay. The length of the discharge channel is approximately 5,200 feet. The thermal limit compliance point in the 1970's was located at the end of the jetty separating the inlet and discharge channels. This point was approximately 5,000 feet downstream of SBPP's property line. The designated compliance point for the thermal limits in the existing NPDES permit is approximately 1,000 feet downstream of the SBPP's property line. The compliance point in the 1970's was therefore approximately 4000 feet downstream of the current compliance point. This effectively provided a large dilution zone, allowing the SBPP to dispense more heat to the discharge channel than is possible by the current compliance location.

It is clear from the above studies that there were detrimental impacts from the SBPP discharge on biological communities; within the eastern portion of the discharge channel.

It is evident from the above findings that revised Section 316(a) studies need to be conducted in order to fully address impacts of the SBPP thermal effluent on benthic communities, fish, and aquatic vegetation present in south San Diego Day. The studies must based on current conditions in south San Diego Bay and reflective of existing operational parameters at the SBPP. Furthermore, the revised studies must place special emphasis on the discharge channel.

Following is a list of critical questions that need to be answered to verify compliance of the current SBPP thermal discharge with Section 316(a) requirements:

1. *What are the effects of the cooling water discharge on aquatic and benthic species during the days when water temperature is the highest in the discharge channel? Are these effects permanent or temporary?*
2. *Does temperature, dissolved oxygen (DO), and/or chemical makeup (chlorine, metals, toxicity etc.) have a combined effect on the species abundance and diversity in the discharge channel?*
3. *What portion of the discharge channel does not support beneficial uses due to elevated temperatures? What are the affected species, and do these species exist in other parts of the discharge channel and in south San Diego Bay?*
4. *What is the effect of the discharge on designated endangered species? What are spatial and temporal effects on endangered species populations within the influence of the plant due to the discharge?*

## A.2 Compliance with Section 316(b) of the Clean Water Act (CWA)

Section 316(b) of the CWA requires that the location, design, construction and capacity of cooling water intake structures reflect the Best Technology Available (BTA) for minimizing adverse environmental impact. By letter dated October 30, 1977, the Regional Board requested SDG&E to initiate studies to demonstrate conformance with the requirements of Section 316(b) of the CWA.

Studies pursuant to Section 316(b) to assess the effects of impingement and entrainment were conducted in 1979-80 (cooling water intake system demonstration project). The studies evaluated both impingement and entrainment effects by quantifying the species, number of organisms, and life stages affected. Entrainment of invertebrate zooplankton and ichthyoplankton were evaluated for different periods of the daily cycle. Impingement and trapping of fishes and larger invertebrates within the intake structure of the power plant were also evaluated. Both entrainment and impingement were evaluated in relation to tidal cycle and season.

In December, 1980, SDG&E submitted the final results of a cooling water intake system demonstration project for the SBPP intended to comply with Section 316(b) of the CWA. SDG&E concluded that "the low and insignificant level of impact demonstrates that the existing SBPP's intake system represents the BTA for this specific site to minimize adverse environmental impacts."

In September, 1993, the USEPA reviewed and concurred with the 1980 SBPP 316(b) demonstration project results which indicated that marine receiving waters in the vicinity of the SBPP contain viable, self-sustaining populations or communities of organisms and that the plant incorporates BTA intake technologies. In 1996 the Regional Board adopted Order No. 96-05 and accepted the 1980 demonstration project for Section 316(b).

Although the intake structure at SBPP has not been changed since the demonstration project was completed in 1980, staff, after consulting with the USEPA, has concluded that the demonstration study is outdated and needs to be updated. By letter dated March 12, 2002, the California Department of Fish and Game (DFG)

also recommended that the Section 316(b) demonstration study be updated. DFG indicated that the 1980 demonstration study was conducted under much different circumstances than we have today. DFG identified the following reasons why the 1980 demonstration study may no longer be applicable to the SBPP and why a new study is warranted: 1) the intake water flow rates through SBPP during the 1980 studies were below the current permitted level of 601 MGD, 2) the discharge channel was not evaluated as a part of San Diego Bay, 3) the re-circulation of the elevated temperature discharge plume from the discharge channel back into the intake channel was not considered, and 4) the BTA from 1980 to 2002 has changed. By letter dated February 26, 2002, the U.S. Fish and Wildlife Service (USFWS) also recommended that Duke Energy should be required to demonstrate that the BTA is being employed to minimize biological organisms lost by impingement and entrainment.

Following is a critical question that needs to be answered to verify compliance of the-current SBPP intake structures-with Section 316(a) requirements:

*Do the location, design, and capacity of the existing cooling water intake structures at SBPP meet the criteria for the best technology available for minimizing adverse environmental impacts, including impingement and entrainment losses, as required by Section 316(b) of the Clean Water Act (CWA)?*

### A.3 Viability and Distribution of Eelgrass in South San Diego Bay

The Basin Plan lists Marine Habitat (MAR) as one of the designated beneficial uses of San Diego Bay. Eelgrass has been identified among the most productive aquatic plant species in San Diego Bay and is conducive to a diverse marine habitat. By letter dated February 26, 2002, the USFWS, has indicated that the effect of the SBPP discharge on the distribution of eelgrass in South San Diego Bay is of concern. Following is an excerpt from USFWS' letter dated February 26, 2002, regarding eelgrass (p.2):

*"Eelgrass is important for many of the species that utilize the Bay. Eelgrass is among the most productive habitats in the ocean and generally associated with diverse invertebrate and fish faunas, both of which serve as prey items for many species of wildlife that utilize south Bay. Therefore, eelgrass serves as a good indicator of a healthy, functioning waterbody. The green sea turtle and brant are known to feed on eelgrass beds within south Bay. Major factors affecting eelgrass distribution include: light levels, temperature, salinity, depth, nutrition, and sediment grain size. We believe the SBPP effluent is a factor affecting the distribution of eelgrass in south Bay because the effluent alters temperature and turbidity in south Bay. We believe the discharge creates disturbance of the bottom sediments, and is likely a greater contributing factor to turbidity, and resulting diminished light levels, in the south Bay than that due to wave action. We would like further evaluation of the effects of the discharge on turbidity in south Bay and the relationship this effect may have on eelgrass distribution."*

Based on USFWS recommendation, it is imperative that the impact of the SBPP discharge on eelgrass beds in south San Diego Bay be studied in order to verify compliance with the water quality objectives of the Basin Plan. Previous studies, conducted on behalf of the discharger (*Environmental Controls on the Distribution of Eelgrass (Zostera marina L.) in South San Diego Bay*, Merkel & Associates, 2000), to investigate the eelgrass distribution in south San Diego Bay did not consider the direct impacts of turbidity and elevated temperatures contained in the SBPP discharge on eelgrass distribution in the discharge channel and other areas of south San Diego Bay. A revised eelgrass study is hence needed to investigate this issue.

The following questions need to be answered in evaluating the impact of SBPP on eelgrass survivability and distribution in the discharge channel and other areas of south San Diego Bay.

1. *Does the discharge volume and velocity from SBPP contribute to the generation of turbidity due to disturbance of bottom sediments?*
2. *Does the SBPP discharge move or redistribute the turbidity caused naturally by wave or wind action?*
3. *What is the impact of the turbidity generated and redistributed by SBPP on the survivability and distribution of eelgrass in south San Diego Bay?*
4. *Does the combined impact of turbidity and temperature impact eelgrass distribution and survivability?*

#### A.4 Impact of Thermal Discharge on Dissolved Oxygen (DO)

The Basin Plan lists Marine Habitat (MAR) as one of the designated beneficial uses of San Diego Bay. Dissolved Oxygen (DO) is a good indicator of the overall health and viability of fish species and other marine communities. Historic temperatures up to 95 or 96 degrees F have been measured at the eastern end of the SBPP discharge channel during summer months. Under extreme conditions of elevated temperature and lowered DO, fish and other mobile organisms could lose the ability to find cooler waters and could become trapped in the cooling water discharge channel. Recent fish surveys indicate a diverse community of certain species of fish now resides in the outer portions of the discharge channel during winter months, however, there is a notable reduction in species diversity, abundance and biomass during summer months.

Staff, in consultation with the US. Fish and Wildlife Service and the California Department of Fish and Game, has concluded that a DO receiving water limit for south San Diego Bay is necessary to ensure protection of beneficial uses. In the absence of valid water quality objectives and conclusive studies regarding DO in south San Diego Bay, there is the need to conduct a study to assist in determining an appropriate site specific numerical DO water quality objective, for the discharge channel and south San Diego Bay. The needed study should investigate the reduction of ambient and saturated DO levels in the discharge channel and south San Diego Bay due to the thermal discharge from SBPP. Furthermore, the study should investigate the impacts of the reduction in DO on the biological resources and beneficial uses of the Bay.

The following questions need to be answered in evaluating the effect of SBPP discharge on DO levels in south San Diego Bay and subsequent impact on the beneficial uses:

1. *Does the heating of water in the discharge channel reduce ambient and saturated DO concentrations to levels that could impact the fish and other biological resources in the discharge channel?*
2. *Is there a minimum DO level necessary to protect fish and other biological resources in the inner portions of the discharge channel?*

#### A.5 Compatibility of Discharge with the Goals of the South San Diego Bay National Refuge

Due to the biological diversity and abundance of fish and wildlife species, the US. Fish and Wildlife Service (USFWS) recently obtained a long-term lease from the State of California to manage the salt ponds and marine waters in certain portions of south San Diego Bay. The area of San Diego Bay leased by the USFWS includes the salt ponds (in the southern most section of San Diego Day) and extends to mouth of the Sweetwater River in the north (see Attachment 1). The USFWS has designated this area as the South San Diego Bay Unit of the San Diego National Wildlife Refuge (NWR). The SBPP discharge channel resides within the boundaries of the NWR, just north of the salt ponds. It is therefore appropriate that Duke Energy investigate the impact of the thermal discharge on the NWR.

The critical question that would have to be answered regarding this issue would be:

*Is the presence of thermal discharge compatible with the goals and objectives of the South San Diego Bay National Wildlife Refuge?*

#### **A.6 Potential Impact on Beneficial Uses Due to Future Termination of Discharge**

The SBPP has been in operation since 1960. Over four decades of continuous operation and discharge of thermal effluent has contributed to the development of an ecosystem in all or part of south San Diego Bay that has probably acclimatized itself to the elevated temperature regime, particularly in the discharge channel. Any future termination of discharge or modification of SBPP operational parameters may impact the ecosystem and effect the marine communities currently residing in the discharge channel. In light of apparent plans to reduce or terminate power production at SBPP, it is necessary that Duke Energy be prepared to initiate an investigation to identify impacts on the biological resources of south San Diego Bay, at least two years prior to any future reduction and/or termination of its cooling water discharge.

A question to be answered regarding this issue would be:

*What would-be the effect of significantly reducing and/or terminating the discharge on the beneficial uses and maintenance of a balanced indigenous population offish, shellfish, and wildlife in south San Diego Bay?*

### **B. Description of Studies**

I am requesting that Duke Energy South Bay, LLC, conduct the following studies to, at a minimum, address the water quality objectives and beneficial use issues and associated critical questions listed in Section A of this letter. The study descriptions provided in Section B, should be used as a starting point, and minimal guidance, for the development and submittal of Workplans for the studies:

#### **B.1 Updated Discharge Impact Assessment Study for Compliance with Section 316(a) of the Clean Water Act (CWA)**

The discharger shall perform a special study to address the ability of the south San Diego Bay area affected by the discharge from the SBPP to support a balanced indigenous population of fish, shellfish, and wildlife in that area. The area of concern shall include the discharge channel outside the power plant property line, and the remainder of the South Bay affected by the discharge. The study shall address the chemistry and toxicology of sediment and water column and benthic communities. At a minimum, physical and chemical measurements will be taken weekly during July though September to address the periods of greatest heat stress imposed on the biota. Analyses will include chemicals found in the discharge as well as physical and chemical measures of sediment and water related to maintenance of biotic populations. The choice of sampling and analytical methods will depend on the species being evaluated. Special consideration shall be given to protecting food and forage species utilized by endangered species, such as the western snowy plover, light-footed clapper rail, California least tern, California brown pelican, and green sea turtle. The study could supplement the findings of previous studies such as the South Bay Power Plant Cooling Water Discharge Channel Fish Community Characterization Study (Merkel & Associates, 2000) and reports of other investigations. Furthermore, the discharger may utilize the discharge and receiving water monitoring data collected, as part of Monitoring and Reporting Program No. 96-05, in conducting this study.

#### **B.2 Section 316(b) CWA Updated Comprehensive Demonstration Study - Intake Structures**

The discharger shall conduct a Comprehensive Demonstration Study (Study) to characterize impingement and entrainment mortality, the operation of cooling water intake structures, and to confirm that the

technologies, operational measures, and/or restoration measures selected and/or implemented at the cooling water intake structure meet the Best Technology Available (BTA).

On February 28, 2002, the USEPA approved a proposed regulation for Section 316(b) of the Clean Water Act, for existing facilities. This proposed regulation, 40 CFR Part 125, Subpart J, *Requirements Applicable to Cooling Water Intake Structures for "Phase if Existing Facilities Under Section 316(b) of the Act,* establishes location, design, construction and capacity standards, for cooling water intake structures at existing power plants that use the largest amounts of cooling water (i.e., greater than or equal to 50.0 MGD).

The Study may be developed using the applicable subparts of Section 125.95(b) of the proposed rule as guidance. Alternatively, the discharger may use the document *Draft Guidance for Evaluation the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: 316(b) AL 92-500, 05/1977* as a basis for developing the Study.

Once the proposed regulation, 40 CFR 125, Subpart J, is finalized by the USEPA, Duke Energy may be required to perform a revised Section 316(b) study and demonstrate compliance with the final performance standards of the regulation.

### **B.3 Updated Eelgrass Study**

The discharger shall perform a study to monitor the geographical extent, density, and condition of eelgrass (*Zostera*) beds in South San Diego Bay affected by the discharge from the SBPP. The study would address the ability of the eelgrass beds to support and maintain a balanced indigenous population of fish, shellfish, and wildlife in the area under the influence of the power plant discharge. The purpose of the study would be to evaluate the ability of eelgrass beds to provide habitat and food and to otherwise influence the occurrence of valuable native or endangered species in south San Diego Bay, including the green sea turtle, which would occur with or without the presence of the discharge. At a minimum, turbidity measurements would be made to evaluate the effects of power plant operation on eelgrass beds and provide information of value in documenting and predicting the effects of normal plant operation and changes in eelgrass beds should the power plant increase or decrease the amount of thermal discharge. The emphasis of the turbidity study would be to discriminate between the effects of wind versus possible increased turbidity caused by the power plant. This study would provide information on changes in the eelgrass beds and could supplement and update the information provided by the discharger in the January 2000 report, *Environmental Controls on the Distribution of Eelgrass (Zostera marina L.) in South San Diego, Bay* (Merkel & Associates, 2000). Furthermore, the discharger may utilize the discharge and receiving water monitoring data collected, as part of Monitoring and Reporting Program No. 96-05, in conducting this study

### **B.4 Updated Dissolved Oxygen Assessment Study**

The discharger shall conduct a dissolved oxygen (DO) assessment study to assist in the determination of an appropriate numerical site specific water quality objective for DO in the SBPP discharge channel and other areas of south San Diego Bay.

The study shall also investigate the impact of the thermal plume from SBPP on naturally occurring DO levels in south San Diego Bay and the saturated DO levels associated with the elevated temperature discharges. The DO study will investigate the ability of the south San Diego Bay area affected by the SBPP discharge to support a balanced indigenous population of fish, shellfish, and wildlife in that area.

The study could supplement and update the findings of previous studies such as the *Technical Rationale and Supporting Documentation for a Proposed Water Quality Objective for Dissolved Oxygen in South San*

*Diego Bay* (Applied Science Associates, 1998) and *Thermal Distribution and Biological Studies for the South Bay Power Plant* (Pioneer Service & Engineering Co., 1973). Furthermore, the discharger may utilize the discharge and receiving water DO monitoring data collected, as part of Monitoring and Reporting Program No. 96-05, in conducting this study.

#### **B.5 Investigation of Compatibility of Discharge with the Goals of the South San Diego Bay National Wildlife Refuge**

The discharger shall consult with U.S. Fish and Wildlife Service to determine the goals and objectives of the South San Diego Bay National Wildlife Refuge and investigate the impact of the thermal discharge on these objectives. The investigation shall be conducted under the auspices of a Refuge Special Use Permit (SUP).

#### **B.6 Special Sunset Study**

When a decision is made to construct a new power plant, terminate the discharge, or to make major modifications to reduce the amount of heat discharged to south San Diego Bay, you shall notify the Regional Board and be prepared to conduct a Special Sunset Study. The Regional Board or the Executive Officer may, at that time, require the you to initiate a special study for the purpose of understanding the effects of proposed changes on the beneficial uses of south San Diego Bay. The study will describe the possible changes and estimate the effects on beneficial uses, including the maintenance of a balanced indigenous population of fish, shellfish, and wildlife in the area under the influence of the power plant discharge. Special consideration will also be given to endangered species, such as the western snowy plover, light-footed clapper rail, California least tern, California brown pelican, and green sea turtle. The Special Sunset Study would also include measures that would mitigate any adverse impacts resulting from significant modifications in the cooling water discharge. The study shall be developed in consultation with the representatives of the following resource agencies: USEPA, Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), RWQCB/SWRCCB, and the California Coastal Commission. The study shall be conducted in such a manner as to ensure its completion at least 24 months prior to the initiation of any significant reduction, or termination of the cooling water discharge.

As part of the Special Sunset Study, the Regional Board or Executive Officer may recommend the formation of a technical advisory committee comprised of external technical experts to review and develop recommendations to the Regional Board on the proposed plan for the Special Sunset Study and to review results of the study.

### **C. Schedule for Initiation and Implementation of Studies**

#### **C.1 Outlines for Workplans**

Outlines for the Workplans for Studies Nos. 1, 2, 3, 4, and 5 (listed in Section B) shall be submitted no later than 75 days from the date of this letter to the Regional Board -and to the following resource agencies USEPA, Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), for review and comment.

#### **C.2 Final Workplans**

Duke Energy shall incorporated the comments and recommendations made by the Regional Board and resource agencies regarding the outlines for the Workplans and submit Final Workplans for the Study Nos. 1, 2, 3, 4. and 5, no later than 75 days after submittal of Outlines.

### **C.3 Commencement of Studies**

Duke Energy shall commence implementation of Studies Nos. 1, 2, 3, 4, and 5 based on Final Workplans, no later than 45 days after submittal of the Final Workplans.

### **C.4 Progress Reports**

Progress reports shall be required for Studies Nov. 1, 2, 3, 4, and 5. These progress reports shall be submitted on a quarterly basis, after commencement of studies. The outline for the Workplans (Section C. 1) shall identify the information the discharger proposes to include in the progress reports.

### **C.5 Submittal of Final Reports**

Duke Energy shall complete Studies Nos. 1, 2, 3, 4, and 5, and submit Final Technical Reports no later than 425 days from the commencement date of the studies (365 days of collection of data and completion of studies and 60 days for compilation of Final Technical Reports). The outline for the Workplans (Section C.1) shall identify the information and analysis the discharger proposes to include in the Final Technical Reports.

Failure to comply with this request may result in a civil liability being assessed by the Regional Board under authority of Sections 13268 of the California Water Code (CWC). The CWC provides that any person failing or refusing to furnish technical or monitoring program reports required under Section 13267(b) is guilty of a misdemeanor and may be subject to administrative civil liabilities up to \$1,000 per day of violation. The Superior Court may impose civil liability of up to \$5,000 per day of violation.

If you have any questions regarding this letter, please contact Mr. Hashim Navrozali (TEL: 858-467-2981, e-mail at [navrh@rb9.swrcb.ca.gov](mailto:navrh@rb9.swrcb.ca.gov)) or Mr. John Phillips (TEL: 858-627-3928, e-mail: [philj@rb9.swrcb.ca.gov](mailto:philj@rb9.swrcb.ca.gov)).

Respectfully,

JOHN H. ROBERTUS  
Executive Officer

Attachment

CC: Joe Okanagan, California Energy Commission, Sacramento  
Kenneth Schiff, Southern California Coastal Water Research Pro act, Westminster  
Dan Chia, California Coastal Commission, San Francisco  
Bill Paznokas, California Department of Fish and Game, San Diego  
Terry Oda, USEPA Region 9, San Francisco  
Scott Sobiech, U.S. Fish and Wildlife Service, Carlsbad  
Bob Hoffman, National Marine Fisheries Service, Long Beach  
Mr. David Merk, Part of San Diego, San Diego  
Environmental Affairs Manager, City of Chula Vista, Chula Vista  
Laura Hunter, Environmental Health Coalition, San Diego  
Bruce Reznik, San Diego BayKeeper, San Diego  
James Peugh, San Diego Audubon Society, San Diego  
Ed Kimura, Sierra Club, San Diego Chapter

# **Appendix B**

## **Daily Average Temperatures: July 17–September 30, 2003**

**Table B1.** Daily average surface temperatures.

**Table B2.** Daily average subsurface (1- m) temperatures.

**Table B3.** Daily average bottom temperatures.

**Table B4.** Daily average intertidal temperatures.

**Table B1.** Daily average surface temperature data, July 17–September 30, 2003.

	DEPTH m	-4.2	-2.3	-1.4	-1.1	-1.3	-1.7	-1.7	-0.4	-1.4	-1.8	-2.0	-3.1	-2.2	-2.6	-0.9	-0.4	-2.0	-2.0	-1.6	-1.9	-2.0
TidalDepth m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
DISTANCE m	4065	2986	2776	2342	2353	1198	113	2672	1865	1639	4965	3282	3137	2853	3320	3349	229	444	620	905	1493	
Date 2003	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5	
<b>JULY</b>																						
16 Jul	24.2	25.9	25.8	27.0	31.0	33.5	25.0	28.2	28.8	26.1	26.0	26.3	25.4	25.3	33.7		33.5	32.4	29.3			
17 Jul	24.4	24.8	26.3	26.4	27.2	29.7	30.8	24.4	28.1	28.8	24.1	26.1	26.2	25.0	25.0	30.8		30.4	30.2	29.0		
18 Jul	23.9	25.2	25.7	26.0	26.3	28.5	30.1	23.8	27.1	27.6	23.7	25.4	25.5	25.7	24.5	24.4	29.8		29.4	29.1	27.9	
19 Jul	24.2	25.1	25.8	26.1	26.6	27.8	29.4	24.4	27.2	27.5	23.9	25.9	25.9	26.2	24.9	24.9	29.2		28.7	28.2	27.4	
20 Jul	24.8	25.8	26.6	26.8	27.5	28.6	29.2	25.4	27.9	28.1	24.6	26.6	26.9	26.1	26.0	29.0		28.6	28.5	28.4		
21 Jul	25.1	25.8	26.7	27.2	27.9	29.8	32.0	25.3	28.5	28.7	24.8	27.0	27.1	27.2	26.6	26.5	32.0		31.5	30.6	29.0	
22 Jul	24.6	25.2	26.1	26.6	27.3	29.7	32.2	24.4	28.3	28.5	24.3	26.7	26.7	26.8	26.3	26.2	31.7		31.3	30.5	29.0	
23 Jul	24.6	25.2	25.7	26.3	26.9	28.3	29.3	24.4	27.7	27.9	24.2	25.9	25.9	26.2	25.5	25.4	29.3		29.1	28.6	27.9	
24 Jul	24.8	25.6	26.2	26.2	27.1	28.5	29.4	24.7	27.5	27.6	24.4	26.3	26.3	26.6	25.4	25.3	29.3		29.1	28.8	28.0	
25 Jul	25.1	25.9	26.6	26.2	27.3	28.3	30.2	24.9	27.5	27.6	24.7	26.7	26.7	26.8	26.0	25.8	30.2		29.8	29.0	27.8	
26 Jul	25.2	26.0	26.6	26.1	27.4	28.7	29.5	25.1	27.7	28.0	24.9	26.8	26.8	26.9	26.3	26.2	29.5		29.2	29.0	28.4	
27 Jul	25.3	25.9	26.5	25.9	27.3	28.8	29.6	25.1	27.4	27.9	25.1	26.7	26.7	26.8	26.3	26.2	29.5		29.4	29.1	28.6	
28 Jul	25.3	25.8	26.3	25.7	26.9	29.2	31.2	25.0	27.3	27.6	25.0	26.2	26.2	26.3	25.9	25.8	31.2		30.8	30.0	28.3	
29 Jul	25.0	25.7	26.1	25.9	26.7	28.7	29.5	24.9	27.2	27.5	24.9	26.1	26.0	26.1	25.6	25.6	29.6		29.4	29.0	28.0	
30 Jul	25.3	26.0	26.4	26.4	27.0	28.6	29.3	25.4	27.4	27.6	25.2	26.3	26.2	26.4	25.8	25.8	29.3		29.2	29.0	28.2	
31 Jul	25.2	26.0	26.6	26.5	27.1	28.0	28.3	25.3	27.6	27.6	25.2	26.5	26.4	25.9	25.8	28.2		28.0	28.0	27.8		
<b>AUGUST</b>																						
1 Aug	25.3	26.0	26.6	26.3	27.2	28.5	29.3	25.6	27.5	27.7	25.3	26.7	26.6	26.7	26.1	26.0	29.2		28.9	28.6	28.1	
2 Aug	25.5	26.2	26.8	26.5	27.3	29.1	30.5	26.0	27.8	28.1	25.4	26.8	26.8	26.8	26.3	26.3	30.6		29.9	29.5	28.7	
3 Aug	25.6	26.3	26.8	26.5	27.4	29.5	31.5	25.7	27.8	28.2	25.4	26.8	26.7	26.8	26.1	26.2	31.6		30.7	30.1	28.5	
4 Aug	25.6	26.3	26.7	26.9	27.4	29.3	31.7	25.6	28.1	28.4	25.4	26.7	26.8	26.9	26.1	26.2	31.8		30.9	30.0	28.8	
5 Aug	25.7	26.3	26.7	26.9	27.5	29.2	31.4	25.8	28.2	28.5	25.4	26.9	26.9	27.1	26.2	26.2	31.4		30.9	29.9	28.8	
6 Aug	25.8	26.4	26.8	27.0	27.8	28.8	30.3	25.8	28.3	28.6	25.4	27.0	27.1	27.3	26.4	26.3	30.3		29.9	29.4	28.6	
7 Aug	25.7	26.6	27.1	27.0	28.1	29.4	31.4	25.8	28.4	28.5	25.5	27.2	27.2	27.4	26.5	26.4	31.1		30.8	30.1	28.5	
8 Aug	26.0	27.2	27.7	27.8	28.5	30.3	32.7	26.2	29.1	29.2	25.7	27.5	27.5	27.7	26.8	26.7	32.6		32.2	31.3	29.3	
9 Aug	26.3	27.5	28.4	28.3	29.1	31.1	32.4	26.6	29.8	30.0	25.8	28.0	28.0	28.3	27.1	27.1	32.4		32.1	31.6	30.4	
10 Aug	26.5	27.9	28.9	28.5	29.5	31.5	33.8	27.0	30.1	30.3	25.9	28.7	28.6	27.7	27.6	33.8		33.4	32.3	31.0		
11 Aug	26.3	27.7	28.7	28.4	29.3	31.9	33.9	26.6	30.1	30.6	25.8	28.2	28.2	27.2	27.3	33.7		33.5	32.9	31.0		
12 Aug	26.0	27.4	28.4	28.3	29.0	31.4	33.3	26.7	29.9	30.3	25.7	28.0	28.0	27.9	26.9	33.2		33.0	32.3	30.7		
13 Aug	26.2	27.7	28.7	28.7	29.2	31.3	33.0	27.0	30.0	30.3	25.8	28.2	28.1	27.0	27.1	32.9		32.6	31.9	30.8		
14 Aug	26.3	27.9	29.0	29.5	31.9	33.5	37.3	30.5	31.1	25.9	28.5	28.4	28.6	27.1	27.1	34.5		32.9	32.3	31.3		
15 Aug	26.4	28.2	29.4	30.2	32.3	34.5	37.6	31.2	31.8	25.9	29.1	29.0	29.3	27.3	27.3	34.4		34.2	33.9	33.2	31.8	
16 Aug	26.3	28.2	29.3	29.6	30.1	32.8	34.5	27.3	31.3	31.8	25.6	29.1	29.0	29.3	27.9	27.8	34.2		34.0	33.8	33.3	32.0
17 Aug	26.1	28.1	29.4	29.7	30.3	32.4	33.3	27.1	31.1	31.4	25.6	29.3	29.4	29.7	28.5	28.5	33.1		32.9	32.8	31.8	
18 Aug	26.0	27.4	28.9	29.3	29.8	32.7	34.8	26.5	31.0	31.6	25.5	29.0	29.0	29.3	28.4	28.4	34.5		34.2	34.0	33.4	32.0
19 Aug	25.4	26.0	27.6	27.8	29.1	31.3	33.1	25.6	30.0	30.9	24.9	28.3	28.3	28.4	27.3	27.1	33.0		32.9	32.7	32.2	30.7
20 Aug	25.2	26.5	27.7	28.3	28.7	30.3	32.6	25.7	29.6	30.0	24.6	27.9	27.9	28.2	26.8	26.9	32.4		32.2	32.0	31.3	29.6
21 Aug	25.2	26.3	27.5	27.7	29.2	30.7	32.3	25.5	29.6	30.0	24.6	28.3	28.4	28.6	27.3	27.3	32.0		31.7	31.5	30.1	
22 Aug	25.0	25.8	26.8	26.9	28.2	32.6	34.8	24.9	28.8	29.1	24.5	27.4	27.3	27.5	26.6	26.3	32.3		31.9	31.7	30.8	28.5
23 Aug	24.7	25.7	26.3	26.4	27.7	28.7	30.9	24.9	28.1	28.2	24.5	27.7	27.0	27.2	26.5	26.5	30.7		30.0	29.9	28.4	
24 Aug	25.1	25.9	26.5	27.1	28.4	29.8	31.7	25.4	28.2	28.5	24.7	27.7	27.8	28.5	27.5	27.5	30.7		30.0	29.8	28.1	
25 Aug	25.3	26.2	26.7	26.4	27.4	28.2	30.6	25.0	27.7	28.4	24.6	27.5	27.6	28.0	27.5	27.5	30.7		30.0	29.8	28.9	
26 Aug	25.6	26.7	27.2	27.7	29.0	30.4	33.1	25.8	28.8	28.8	25.3	27.0	27.2	27.4	26.4	26.4	32.5		32.6	32.2	31.1	29.6
27 Aug	25.6	26.8	27.4	27.5	27.9	30.4	33.1	25.8	28.8	29.2	25.3	27.0	27.4	27.6	26.0	26.2	32.9		32.6	32.4	31.5	29.7
28 Aug	25.7	27.0	27.8	27.9	28.3	30.5	33.2	26.0	29.4	29.7	25.3	27.4	27.2	27.4	26.4	26.4	32.5		32.2	31.4	30.0	
29 Aug	25.8	27.1	27.9	28.1	28.4	30.1	33.4	25.9	29.3	29.6	25.4	27.5	27.4	27.6	26.4	26.4	33.0		32.6	32.3	31.1	29.7
30 Aug	25.5	26.8	27.3	27.4	27.9	29.6	30.5	25.4	28.5	28.7	25.2	27.0	27.0	27.2	26.3	26.2	30.4		30.2	30.0	29.9	29.2
31 Aug	25.3	26.6	27.0	27.1	27.5	29.3	30.2	25.5	28.1	28.2	26.7	26.7	26.8	26.1	26.1	30.1	29.9	29.7	29.5	28.9	28.1	
<b>SEPTEMBER</b>																						
1 Sep	25.1	26.3	26.5	26.7	27.1	28.6	29.6	25.2	27.6	27.9	25.0	26.3	26.2	26.4	25.8	25.7						

**Table B2.** Daily average subsurface (-1 m) temperature data, July 17–September 30, 2003.

	DEPTH m	-4.2	-2.3	-1.4	-1.1	-1.3	-1.7	-0.4	-1.4	-1.8	-2.0	-3.1	-2.2	-2.6	-0.9	-0.4	-2.0	-2.0	-1.6	-1.9	-2.0
TidalDepth m	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0	-1.0
DISTANCE m	4065	2986	2776	2342	2353	1198	113	2672	1865	1639	4965	3282	3137	2853	3320	3349	229	444	620	905	1493
Date 2003	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<b>JULY</b>																					
	No Data - Equipment Malfunction	26.0	25.6	26.8	30.0	33.4	25.0	27.4	27.7	26.0	25.9	26.1	25.3	25.2	33.4	33.1	29.7	28.7			
16 Jul		24.7	26.3	26.3	27.0	29.2	30.6	24.4	27.7	28.1	24.1	25.9	25.8	26.0	24.9	24.9	30.6	30.4	28.9	28.4	
17 Jul		25.0	25.7	25.7	26.2	28.1	29.5	23.8	26.7	27.1	23.7	25.4	25.3	25.4	24.4	24.4	29.4	29.4	28.1	27.6	
18 Jul		25.0	25.9	25.9	26.5	27.5	28.8	24.3	26.9	27.1	23.8	25.7	25.6	25.9	24.8	24.8	28.5	28.3	27.4	27.2	
19 Jul		25.6	26.6	26.6	27.4	28.5	28.9	25.3	27.8	28.0	24.5	26.6	26.5	26.7	26.1	26.0	28.7	28.6	28.4	28.3	
20 Jul		25.7	26.7	26.9	27.8	29.6	31.9	25.3	28.3	28.4	24.7	27.0	27.0	27.1	26.5	26.4	31.9	31.4	29.9	28.7	
21 Jul		25.1	26.2	26.3	27.2	29.2	31.5	24.4	27.9	28.1	24.2	26.7	26.6	26.6	26.2	26.1	31.4	31.1	29.0	28.7	
22 Jul		25.0	25.8	26.2	26.8	28.0	28.9	24.4	27.6	27.7	24.1	25.9	25.8	26.1	25.4	25.3	29.1	29.0	28.0	27.7	
23 Jul		25.4	26.3	26.2	27.1	28.4	29.1	24.7	27.3	27.4	24.3	26.3	26.2	26.4	25.3	25.3	29.2	29.1	28.5	27.7	
24 Jul		25.7	26.7	26.3	27.2	28.2	29.8	24.9	27.4	27.4	24.6	26.7	26.5	26.6	25.9	25.8	29.9	29.7	28.2	27.5	
25 Jul		25.9	26.7	26.1	27.3	28.6	29.5	25.1	27.4	27.8	24.9	26.7	26.7	26.3	26.1	29.5	29.3	28.7	28.3	28.3	
26 Jul		25.8	26.6	26.0	27.2	28.7	29.6	25.1	27.1	27.7	25.0	26.6	26.5	26.7	26.2	26.1	29.6	29.5	28.8	28.4	
27 Jul		25.7	26.4	25.8	26.9	28.8	31.0	25.0	27.0	27.4	25.0	26.1	26.1	26.3	25.8	25.8	31.1	30.7	29.0	27.9	
28 Jul		25.7	26.2	26.0	26.6	28.3	29.4	24.9	27.0	27.1	24.8	26.0	25.9	26.0	25.6	25.6	29.3	29.4	28.2	27.7	
29 Jul		26.0	26.5	26.5	26.9	28.4	29.3	25.5	27.4	27.4	25.1	26.2	26.1	26.3	25.8	25.7	29.3	29.3	28.5	27.8	
30 Jul		26.0	26.7	26.5	27.1	27.9	28.2	25.4	27.5	27.5	25.1	26.4	26.3	26.4	25.8	25.8	28.2	28.1	27.9	27.7	
31 Jul		25.7	26.4	25.8	26.9	28.8	31.0	25.0	27.0	27.4	25.0	26.1	26.1	26.3	25.8	25.8	31.1	30.7	29.0	27.9	
<b>AUGUST</b>																					
1 Aug		25.9	26.7	26.4	27.1	28.3	29.1	25.6	27.3	27.5	25.2	26.6	26.5	26.1	26.0	29.1	28.9	28.3	27.9		
2 Aug		26.1	26.9	26.5	27.3	28.9	30.1	26.0	27.6	27.8	25.3	26.7	26.7	26.8	26.3	26.3	30.2	29.8	28.9	28.2	
3 Aug		26.2	26.9	26.5	27.3	29.2	31.0	25.8	27.6	27.9	25.3	26.7	26.6	26.7	26.1	26.1	31.1	30.6	29.2	28.2	
4 Aug		26.2	26.8	26.8	27.3	29.1	31.2	25.7	27.8	27.9	25.3	26.7	26.7	26.8	26.0	26.1	31.3	30.7	29.2	28.4	
5 Aug		26.1	26.9	26.9	27.4	29.1	31.2	25.8	27.9	28.2	25.4	26.9	26.8	26.2	26.1	31.2	30.7	29.2	28.6		
6 Aug		26.2	27.0	27.0	27.7	28.7	30.2	25.8	28.1	28.3	25.4	27.0	27.0	27.2	26.3	26.3	30.2	30.0	29.0	28.4	
7 Aug		26.4	27.2	27.0	27.9	29.2	30.8	25.8	28.0	28.1	25.4	27.1	27.1	27.3	26.5	26.4	30.9	30.7	29.4	28.2	
8 Aug		27.1	27.8	27.8	28.4	29.9	32.4	26.1	28.8	28.8	25.6	27.4	27.4	27.5	26.7	26.6	32.4	32.1	30.0	28.8	
9 Aug		27.4	28.5	28.3	29.0	30.6	32.2	26.6	29.4	29.6	25.7	27.9	27.8	27.9	27.1	27.0	32.2	32.1	30.6	30.0	
10 Aug		27.8	29.0	28.6	29.4	31.1	33.6	27.0	29.8	30.0	25.8	28.5	28.4	28.3	27.6	27.5	33.5	33.2	31.2	30.5	
11 Aug		27.5	28.8	28.4	29.2	31.5	33.5	26.6	29.8	30.0	25.7	28.1	28.1	28.0	27.2	27.3	33.6	33.4	31.6	30.5	
12 Aug		27.3	28.4	28.3	28.9	31.1	32.9	26.8	29.7	29.6	25.6	27.8	27.8	27.8	26.9	26.8	33.0	32.8	31.2	30.3	
13 Aug		27.6	28.7	28.7	29.1	31.0	32.8	27.0	29.8	29.8	25.7	28.0	28.0	28.1	27.0	27.0	32.8	32.6	31.1	30.4	
14 Aug		27.8	29.0	29.0	29.4	31.6	32.6	27.3	30.2	30.3	25.8	28.4	28.2	28.3	27.1	27.1	32.9	33.7	32.7	31.6	
15 Aug		28.1	29.4	29.1	30.1	32.0	33.6	27.7	30.8	30.9	25.7	28.8	28.7	28.9	27.2	27.2	33.6	33.2	31.6	31.6	
16 Aug		27.9	29.3	29.4	30.0	32.5	34.1	27.4	30.9	31.1	25.5	28.9	28.8	29.0	27.9	27.8	33.9	33.4	32.5	31.5	
17 Aug		27.8	29.5	29.2	30.2	32.2	33.2	27.2	30.9	31.1	25.5	29.2	29.3	29.5	28.4	28.5	33.0	32.6	32.9	32.4	
18 Aug		27.2	29.0	28.9	29.8	32.6	34.4	26.5	30.7	31.2	25.5	29.0	28.9	29.1	28.4	28.2	34.3	34.1	32.6	31.8	
19 Aug		25.9	27.7	27.5	29.1	31.1	33.0	25.5	29.6	30.1	24.9	28.3	28.2	28.3	27.2	27.0	32.9	32.4	31.8	30.6	
20 Aug		26.3	27.8	28.3	28.6	30.1	32.4	25.7	29.3	29.4	24.5	27.8	27.8	28.2	26.8	26.8	32.3	31.8	32.0	30.4	
21 Aug		26.2	27.6	27.6	29.1	30.5	32.0	25.5	29.4	29.8	24.6	28.3	28.3	28.5	27.3	27.2	33.6	33.2	31.6	31.6	
22 Aug		25.7	26.9	26.8	28.2	29.5	32.2	24.9	28.5	28.7	24.4	27.4	27.3	27.4	26.5	26.3	32.1	31.5	31.7	30.2	
23 Aug		25.5	26.5	26.5	27.6	28.6	29.5	24.9	28.0	28.1	24.4	26.2	26.2	26.4	25.7	25.7	29.6	29.1	28.8	28.1	
24 Aug		25.7	26.7	26.2	27.4	28.1	29.3	25.4	27.4	27.8	24.7	26.5	26.4	26.7	25.9	25.9	28.8	29.0	28.2	28.0	
25 Aug		26.1	26.8	26.4	27.3	29.5	32.7	25.7	28.5	28.5	25.0	27.6	27.6	27.7	26.5	26.4	31.9	32.1	30.9	30.1	
26 Aug		26.6	27.1	27.3	27.6	29.9	32.7	25.8	28.5	28.6	25.2	27.6	26.8	26.8	26.2	26.2	32.5	31.9	32.1	30.1	
27 Aug		26.7	27.5	27.5	27.9	29.9	32.7	25.8	28.6	28.5	25.2	27.3	27.3	27.4	26.6	26.2	32.5	31.9	31.8	30.5	
28 Aug		26.9	27.9	28.0	28.2	30.2	32.5	26.0	29.1	29.0	25.2	27.3	27.1	27.3	26.3	26.4	32.3	31.6	31.8	30.5	
29 Aug		27.0	27.9	28.1	28.3	29.8	32.8	26.0	29.1	28.9	25.3	27.4	27.3	27.4	26.4	26.3	32.5	31.8	31.9	30.1	
30 Aug		26.7	27.3	27.5	27.8	29.2	30.0	25.5	28.4	28.5	25.1	26.9	26.9	27.0	26.2	26.1	30.1	29.6	29.9	29.3	
31 Aug		26.5	27.1	27.1	27.5	28.9	29.8	25.5	27.9	28.0	25.1	26.7	26.6	26.8	26.1	26.1	29.9	29.7	29.1	28.4	
<b>SEPTEMBER</b>																					
1 Sep		26.2	26.6	26.8	27.0	28.4	29.3	25.2	27.4	27.6	25.0	26.3	26.2	26.4	25.7	25.7	29.3	28.8	29.2	28.4	27.9
2 Sep		25.7	26.6	26.6	26.9	28.6	30.3	25.0	27.4	27.7	24.7	26.1	26.1	26.4	25.4	25.5	30.1	29.6	29.8	29.0	27.8
3																					

**Table B3.** Daily average **bottom** temperature data, July 17–September 30, 2003.

DEPTH m	-4.2	-2.3	-1.4	-1.1	-1.3	-1.7	-1.7	-0.4	-1.4	-1.8	-2.0	-3.1	-2.2	-2.6	-0.9	-0.4	-2.0	-2.0	-1.6	-1.9	-2.0
TidalDepth m	-4.2	-2.3	-1.4	-1.1	-1.3	-1.7	-1.7	-0.4	-1.4	-1.8	-2.0	-3.1	-2.2	-2.6	-0.9	-0.4	-2.0	-2.0	-1.6	-1.9	-2.0
DISTANCE m	4065	2986	2776	2342	2353	1198	113	2672	1865	1639	4965	3282	3137	2853	3320	3349	229	444	620	905	1493
Date 2003	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<b>JULY</b>																					
16 Jul	24.2	25.8	25.7	26.6	27.4	32.1	25.1	26.8	27.1	25.7	25.9	25.8	25.4	31.1		31.2	27.3	27.7			
17 Jul	24.3	24.7	26.2	26.3	26.9	27.8	30.1	24.4	27.2	27.7	24.1	25.7	25.9	25.7	30.1		29.5	27.9	27.8		
18 Jul	24.0	25.1	25.7	25.7	26.1	27.2	28.8	23.9	26.4	26.8	23.8	25.2	25.4	25.3	29.0		28.7	27.2	27.4		
19 Jul	24.0	25.2	25.7	25.9	26.4	26.9	27.4	24.4	26.7	26.9	23.8	24.9	25.6	25.3	27.5		27.3	26.7	26.8		
20 Jul	24.8	25.6	26.4	26.6	27.3	28.2	28.1	25.4	27.6	27.9	24.5	25.9	26.4	26.1	26.1		28.3	28.4	28.0		
21 Jul	25.0	25.7	26.7	26.9	27.8	29.0	31.3	25.3	28.0	28.3	24.7	26.7	27.0	26.9	30.9		30.0	29.3	28.4		
22 Jul	24.7	25.1	26.3	26.3	27.0	28.4	30.4	24.5	27.6	27.9	24.3	26.4	26.7	26.2	30.3		29.2	28.3	28.2		
23 Jul	24.4	25.0	26.0	26.2	26.8	27.3	27.5	24.5	27.4	27.6	24.1	25.5	26.0	25.9	27.7		27.8	27.7	27.4		
24 Jul	24.7	25.6	26.4	26.3	27.1	27.1	28.0	24.8	27.1	27.4	24.3	25.8	26.2	26.0	28.6		28.6	27.6	27.2		
25 Jul	24.9	25.7	26.6	26.3	27.1	27.3	28.5	25.0	27.0	27.3	24.7	26.0	26.5	26.2	26.0		28.3	27.6	27.3		
26 Jul	25.2	26.0	26.7	26.2	27.2	28.3	29.2	25.2	27.1	27.7	24.9	26.3	26.6	26.4	29.5		28.9	28.5	27.9		
27 Jul	25.3	25.8	26.7	26.0	27.2	28.5	29.4	25.1	27.0	27.6	25.0	26.3	26.5	26.4	29.6		29.0	28.6	28.2		
28 Jul	25.2	25.7	26.5	25.8	26.9	27.7	30.5	25.1	26.9	27.4	25.0	26.0	26.1	25.9	29.8		29.3	28.1	27.6		
29 Jul	25.0	25.7	26.2	26.0	26.6	27.0	28.3	24.9	26.9	27.0	24.9	25.6	25.9	25.7	28.0		28.5	27.1	27.2		
30 Jul	25.2	26.0	26.5	26.5	26.9	27.5	28.9	25.5	27.4	27.4	25.1	25.8	26.2	25.9	28.4		28.9	27.6	27.4		
31 Jul	25.2	26.0	26.7	26.6	27.0	27.7	27.5	25.4	27.3	27.5	25.2	26.1	26.3	26.0	25.9	28.1		27.9	27.7	27.5	
<b>AUGUST</b>															No Data - Equipment Malfunction						
1 Aug	25.3	25.9	26.7	26.4	27.1	27.8	28.3	25.7	27.2	27.4	25.3	26.2	26.5	26.2	28.5		28.4	28.1	27.6		
2 Aug	25.5	26.1	26.9	26.6	27.3	28.2	28.5	26.0	27.5	27.8	25.4	26.4	26.7	26.5	28.9		28.7	28.6	27.9		
3 Aug	25.6	26.1	26.9	26.5	27.3	28.3	28.6	25.8	27.5	27.8	25.3	26.2	26.6	26.4	28.8		28.9	28.5	27.9		
4 Aug	25.6	26.2	26.8	26.8	27.2	28.5	28.6	25.7	27.7	27.8	25.3	26.2	26.7	26.5	28.8		29.1	28.8	28.0		
5 Aug	25.6	26.2	26.9	26.9	27.4	28.7	29.1	25.9	27.7	28.0	25.4	26.3	26.8	26.7	29.1		28.9	28.9	28.2		
6 Aug	25.8	26.3	27.0	27.0	27.7	28.5	29.3	25.8	27.8	28.3	25.4	26.6	27.0	26.9	29.2		28.8	28.8	28.4		
7 Aug	25.8	26.5	27.3	27.0	27.9	27.9	29.1	25.9	27.9	27.9	25.4	26.5	27.1	26.9	29.7		29.3	28.3	27.9		
8 Aug	25.7	27.1	27.7	27.9	28.3	28.3	31.2	26.2	28.6	28.8	25.6	26.9	27.5	27.1	31.1		30.3	28.4	28.5		
9 Aug	25.5	27.4	28.3	28.3	28.8	29.5	31.4	26.6	29.2	29.5	25.6	27.3	27.8	27.2	31.5		31.0	29.7	29.7		
10 Aug	25.8	27.7	28.9	28.6	29.3	30.0	32.1	27.1	29.5	29.8	25.7	27.8	28.3	27.7	31.8		31.5	30.3	30.0		
11 Aug	25.9	27.5	28.8	28.4	29.1	30.3	32.6	26.7	29.6	29.8	25.7	27.9	28.1	27.7	32.4		31.9	30.5	30.2		
12 Aug	25.7	27.3	28.3	28.4	28.8	29.7	31.7	26.8	29.5	29.5	25.5	27.5	27.8	27.4	31.7		31.5	29.7	29.8		
13 Aug	25.8	27.6	28.6	28.7	29.0	29.8	32.2	27.1	29.6	29.7	25.6	27.6	28.0	27.1	32.1		31.2	30.1	29.9		
14 Aug	25.8	27.8	28.7	29.0	29.3	30.4	30.9	27.3	29.9	30.1	25.7	27.9	28.2	27.7	31.5		32.7	31.5	30.4	30.4	
15 Aug	25.2	28.0	29.1	29.2	29.9	30.7	31.1	27.7	30.2	30.6	25.5	28.1	28.5	28.1	31.5		31.4	31.4	30.9	30.8	
16 Aug	24.6	27.7	29.0	29.3	29.9	31.0	33.0	27.4	30.4	30.9	25.3	28.4	28.7	27.9	32.7		32.8	32.6	31.1	31.0	
17 Aug	25.5	27.7	29.3	29.1	30.1	31.3	32.6	27.2	30.5	30.9	25.5	28.6	29.2	29.0	32.5		32.5	32.4	31.7	31.1	
18 Aug	25.4	27.3	29.0	28.8	29.5	31.1	33.7	26.6	30.1	30.9	25.5	28.4	28.9	28.5	33.9		32.9	32.5	31.5	31.2	
19 Aug	23.2	26.0	27.8	27.5	28.9	29.7	31.5	26.5	29.2	29.6	24.6	27.7	28.2	28.0	30.9		30.4	30.3	29.7	30.3	
20 Aug	24.0	26.7	28.1	28.4	28.5	29.2	31.9	25.7	29.1	29.2	24.5	27.4	27.9	28.0	31.2		30.8	30.5	29.4	29.2	
21 Aug	25.1	26.2	27.6	27.6	28.9	29.7	31.4	25.6	29.0	29.7	24.6	27.7	28.2	28.0	31.5		31.3	31.1	30.3	29.4	
22 Aug	25.0	25.6	26.9	26.9	28.1	28.6	31.5	25.0	28.2	28.6	24.4	27.1	27.4	27.3	31.4		31.0	30.4	29.1	28.3	
23 Aug	24.9	25.7	26.8	26.6	27.6	28.0	28.4	24.9	27.7	28.1	24.4	26.1	26.4	26.3	28.6		28.6	28.6	28.5	27.8	
24 Aug	25.1	25.8	26.9	26.3	27.4	28.0	28.2	25.5	27.3	27.7	24.7	26.2	26.6	26.4	28.6		28.4	28.3	28.0	27.9	
25 Aug	25.4	26.1	26.9	26.5	27.3	28.1	31.0	25.8	27.6	27.8	25.0	26.2	26.6	26.5	30.2		30.1	29.7	28.2	27.9	
26 Aug	25.4	26.6	27.1	27.3	27.6	28.5	31.6	25.9	28.2	28.3	25.2	26.4	26.7	26.5	30.6		30.4	28.5	28.4	28.4	
27 Aug	25.4	26.7	27.4	27.6	27.8	28.6	31.1	25.8	28.5	28.4	25.2	26.5	26.8	26.6	30.5		30.3	30.1	28.6	28.6	
28 Aug	25.5	26.9	27.8	28.0	28.1	29.2	30.8	26.1	28.9	28.9	25.2	26.8	27.2	26.8	30.7		30.4	30.4	29.8	29.0	
29 Aug	25.6	27.0	27.9	28.1	28.2	28.8	31.4	26.0	28.9	28.9	25.3	27.0	27.3	26.8	30.8		30.4	30.0	29.5	28.8	
30 Aug	25.3	26.7	27.3	27.5	27.8	28.4	28.7	25.5	28.3	28.4	25.1	26.8	27.0	26.6	29.2		29.1	29.1	28.5	28.5	
31 Aug	25.3	26.6	27.1	27.2	27.4	28.2	28.5	25.6	27.8	28.0	25.0	26.4	26.7	26.5	28.9		29.1	29.0	28.3	28.1	
<b>SEPTEMBER</b>																					
1 Sep	25.3	26.3	26.7	26.8	27.0	27.7	28.2	25.2	27.3	27.4	25.0	26.3	26.5	26.4	25.8		28.6	28.2	28.2	28.0	
2 Sep	25.1	25.8	26.6	26.7	26.9	27.5	29.7	25.1	27.1	27.4	24.7	25.9	26.2	26.1	25.5		29.5	29.2	28.9	28.4	
3 Sep	24.9	25.3	26.3	26.3	27.3	28.6	29.9	24.9	27.5	28.1	24.6	26.1	26.4	26.2	25.7		29.6	29.4	29.3	29.2	
4 Sep	25.0	25.5	26.4	26.3	27.1	27.9	31.0	25.0	26.9	27.9	24.5	26.3	26.6	26.3	26.1		31.1	30.8	30.6	28.5	
5 Sep	25.4	26.3	27.0	27.2	28.0	28.7	32.1	25.8	28.0	28.7	24.9	26.5	27.0	26.7	2						

**Table B4.** Daily average **intertidal** temperature data, July 17–September 30, 2003. Atmospheric temperatures (when units were exposed to air at low tides) are excluded from averages.

DEPTH m	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
TidalDepth m	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
DISTANCE m	3231	3060	2834	3551	3565	230	410	669	881	1523	
Date 2003	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5	
<b>JULY</b>											
16 Jul	26.4	26.4	26.6	25.6	25.6	33.3	33.3	32.9	30.9	28.2	
17 Jul	26.0	26.1	25.9	24.8	24.8	31.1	30.9	30.9	29.8	28.5	
18 Jul	25.3	25.6	25.3	24.0	24.3	29.8	29.7	29.8	29.0	27.6	
19 Jul	25.7	26.0	25.8	24.9	25.0	29.1	29.0	28.6	28.1	27.3	
20 Jul	26.5	26.8	26.9	25.7	25.8	28.8	28.7	28.6	28.5	28.1	
21 Jul	27.0	27.3	27.0	26.1	26.3	31.7	31.4	31.2	30.2	28.4	
22 Jul	26.5	26.7	26.0	25.5	25.5	31.3	31.1	30.9	29.6	28.6	
23 Jul	25.9	26.1	26.0	25.5	25.6	29.1	29.0	28.9	28.4	27.7	
24 Jul	26.3	26.5	26.4	25.3	25.3	29.4	29.3	29.2	28.8	27.6	
25 Jul	26.8	26.8	26.8	26.0	26.1	30.5	30.2	29.7	28.8	27.5	
26 Jul	26.9	27.0	26.8	26.1	26.3	29.6	29.6	29.5	28.9	28.2	
27 Jul	26.9	27.0	26.8	26.3	26.4	29.7	29.6	29.5	29.0	28.3	
28 Jul	26.3	26.4	26.3	25.7	25.8	31.3	30.9	30.6	29.3	27.7	
29 Jul	26.3	26.3	26.2	25.9	26.0	29.9	29.9	29.9	29.0	27.8	
30 Jul	26.5	26.5	26.4	26.1	26.2	29.7	29.5	29.7	29.0	27.9	
31 Jul	26.7	26.7	26.6	26.1	26.1	28.3	28.3	28.3	28.2	27.7	
<b>AUGUST</b>											
1 Aug	27.0	27.0	26.7	26.2	26.2	29.6	29.5	29.2	28.9	28.0	
2 Aug	27.1	27.1	26.8	26.1	26.3	30.6	30.3	29.8	29.5	28.2	
3 Aug	26.8	27.1	26.8	26.0	26.2	31.5	31.0	30.5	29.9	28.1	
4 Aug	26.5	26.7	26.5	25.8	26.0	31.4	31.1	30.3	29.6	28.3	
5 Aug	26.5	26.9	26.8	26.0	26.1	31.6	31.3	30.6	29.6	28.5	
6 Aug	27.0	27.3	27.2	26.1	26.2	30.4	30.2	29.8	29.3	28.3	
7 Aug	27.4	27.5	27.4	26.4	26.6	31.4	31.2	30.7	29.9	28.1	
8 Aug	27.7	27.8	27.8	26.9	27.1	33.3	32.8	32.0	30.8	28.8	
9 Aug	28.4	28.3	28.3	27.5	27.6	32.8	32.6	32.2	31.2	30.1	
10 Aug	29.0	28.9	28.7	27.9	28.0	34.2	34.0	33.1	31.8	30.7	
11 Aug	28.5	28.4	28.3	27.4	27.5	34.0	33.6	33.1	32.1	30.2	
12 Aug	28.4	28.3	28.1	27.2	27.2	33.6	33.5	32.9	32.0	30.3	
13 Aug	28.6	28.5	28.4	27.4	27.4	33.4	33.2	32.6	31.7	30.6	
14 Aug	28.8	28.6	28.7	27.4	27.4	33.6	33.4	32.9	32.1	31.0	
15 Aug	29.0	29.0	29.1	27.3	27.3	34.4	34.2	33.8	32.2	31.7	
16 Aug	28.9	29.0	28.8	27.4	27.5	34.0	33.9	33.8	32.9	31.5	
17 Aug	29.3	29.6	29.2	27.7	27.9	32.9	32.8	32.8	32.4	31.5	
18 Aug	28.7	29.0	28.8	27.5	27.7	34.3	34.0	34.0	32.7	31.6	
19 Aug	28.1	28.4	28.2	26.2	26.6	33.0	33.0	33.0	31.2	30.4	
20 Aug	28.0	28.1	27.8	26.8	26.9	32.3	32.2	32.3	30.7	29.3	
21 Aug	28.4	28.4	28.1	26.8	27.0	31.7	31.6	31.8	30.8	29.6	
22 Aug	27.4	27.4	27.1	26.0	26.2	32.2	31.9	32.1	30.2	28.1	
23 Aug	26.8	26.7	26.7	25.6	25.8	29.9	29.9	29.9	29.1	28.0	
24 Aug	26.9	26.9	26.9	26.1	26.2	29.5	29.4	29.1	28.4	28.0	
25 Aug	27.0	26.9	26.9	26.4	26.4	33.1	32.7	32.1	30.5	28.3	
26 Aug	27.3	27.1	27.0	26.5	26.5	33.2	32.7	31.9	30.7	29.2	
27 Aug	27.5	27.4	27.3	26.5	26.6	33.1	32.6	31.9	30.7	29.2	
28 Aug	27.8	27.8	27.6	26.6	26.6	33.0	32.6	31.8	30.9	29.7	
29 Aug	27.8	27.7	27.5	26.4	26.5	33.1	32.8	32.1	30.5	29.4	
30 Aug	27.2	27.1	27.1	26.0	26.2	30.3	30.0	30.0	29.4	28.8	
31 Aug	26.7	26.7	26.8	26.0	26.2	30.0	29.7	29.7	29.1	28.4	
<b>SEPTEMBER</b>											
1 Sep	26.1	26.1	26.3	25.4	25.6	29.3	29.1	29.2	28.5	27.8	
2 Sep	26.0	26.2	26.2	25.3	25.5	30.1	29.8	29.7	28.9	27.5	
3 Sep	26.6	26.7	26.6	25.2	25.4	30.1	30.0	29.9	29.3	27.9	
4 Sep	26.7	26.8	26.8	25.2	25.6	31.4	31.2	31.0	30.0	28.2	
5 Sep	27.5	27.3	27.4	26.2	26.5	33.5	33.2	32.6	30.7	29.2	
6 Sep	28.2	27.9	28.0	27.3	27.3	32.4	32.1	31.6	30.3	29.2	
7 Sep	28.4	28.3	28.2	27.6	27.7	33.2	33.0	32.1	30.9	30.1	
8 Sep	28.2	28.2	28.1	26.9	27.0	33.4	33.2	32.3	31.0	30.3	
9 Sep	27.1	27.0	27.1	25.7	25.9	33.1	32.8	32.0	30.5	30.0	
10 Sep	26.4	26.3	26.5	25.4	25.6	30.8	30.5	30.2	29.1	28.5	
11 Sep	26.3	26.3	26.3	25.5	25.6	29.8	29.6	29.4	28.8	28.0	
12 Sep	26.5	26.4	26.3	25.4	25.5	29.7	29.5	29.3	28.8	27.9	
13 Sep	26.1	26.2	26.3	25.5	25.7	30.2	29.8	29.7	29.2	27.9	
14 Sep	26.2	26.3	26.0	25.3	25.4	29.2	28.8	29.1	28.7	27.9	
15 Sep	26.4	26.4	26.2	25.1	25.3	30.5	30.0	30.1	29.6	27.8	
16 Sep	25.8	25.9	25.7	24.9	25.1	30.2	29.8	29.9	29.4	27.3	
17 Sep	25.7	25.7	26.0	24.6	24.8	29.8	29.4	29.5	28.9	27.9	
18 Sep	25.9	25.9	26.0	24.7	24.9	29.1	28.9	29.0	28.4	27.6	
19 Sep	26.0	26.1	26.2	24.8	25.0	29.2	29.1	29.0	28.4	26.9	
20 Sep	26.0	26.1	25.8	25.2	25.3	29.3	28.9	28.3	27.7	27.0	
21 Sep	25.8	25.9	25.6	25.2	25.4	29.3	29.1	28.9	28.1	26.9	
22 Sep	25.9	25.9	25.7	25.2	25.3	30.1	29.9	29.9	28.7	26.9	
23 Sep	25.4	25.2	25.1	24.5	24.7	28.7	28.6	28.7	28.0	27.0	
24 Sep	24.8	24.8	24.6	23.8	24.0	28.0	27.7	27.7	27.0	26.2	
25 Sep	24.6	24.3	24.3	23.7	23.8	26.8	26.7	26.6	26.4	25.7	
26 Sep	24.1	23.9	24.0	23.3	23.5	27.9	27.6	27.0	26.1	25.3	
27 Sep	23.7	23.6	23.7	22.9	23.1	25.7	25.5	25.5	25.3	24.9	
28 Sep	23.3	23.2	23.3	22.6	22.8	25.3	25.1	25.3	24.9	24.5	
29 Sep	23.0	22.9	23.1	22.5	22.7	26.6	26.2	26.0	25.3	24.4	
30 Sep	22.8	22.7	22.9	22.4	22.6	26.5	26.1	26.2	25.2	24.2	

# **Appendix E**

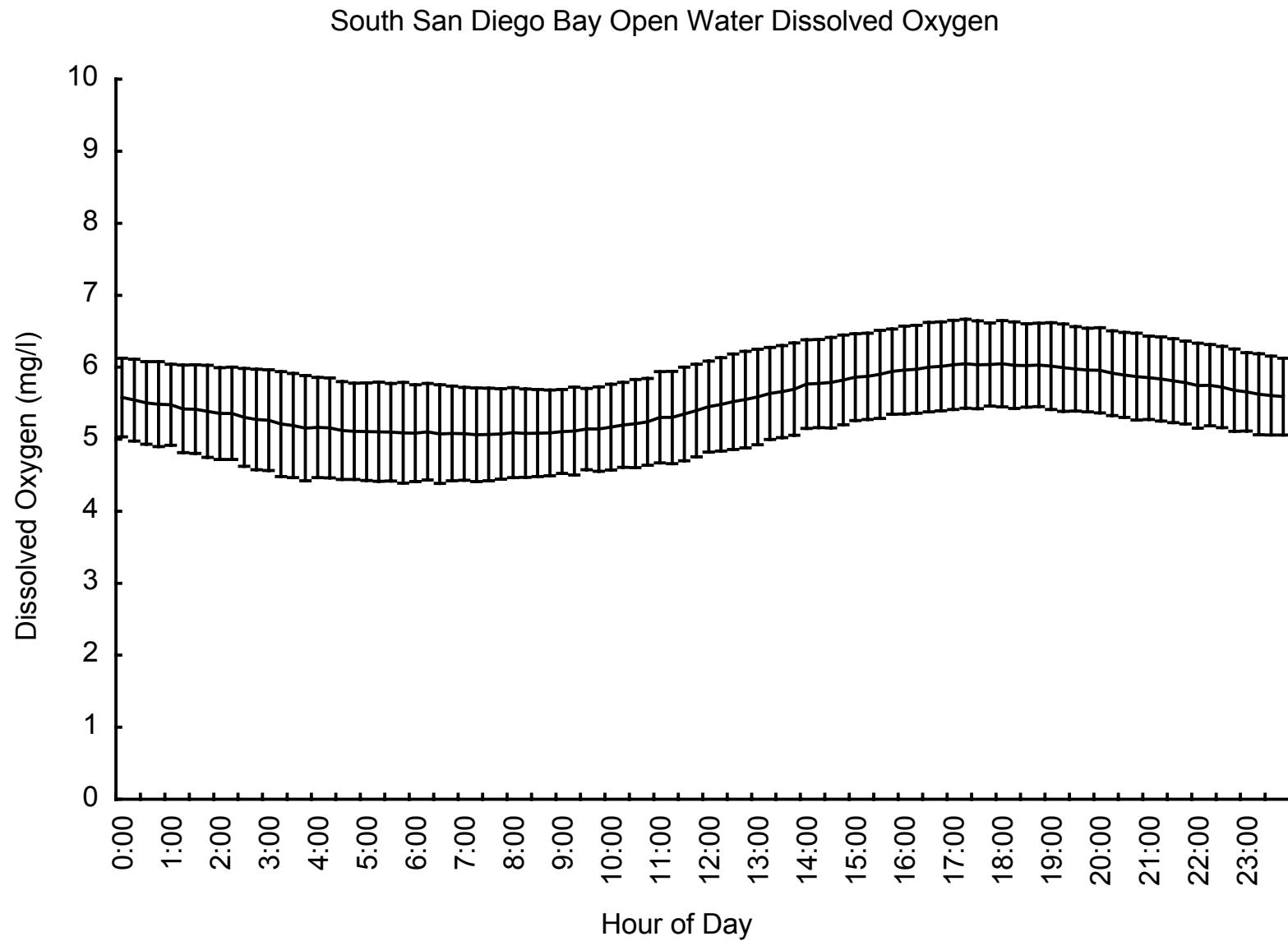
## **Dissolved Oxygen Study Data**

**Table E1a.** Hydrolab Multiprobe deployment periods for each of the eight south San Diego Bay monitoring stations. “Type” refers to the South Bay Power Plant discharge channel (DC) and south San Diego Bay open water (OW) monitoring sites.

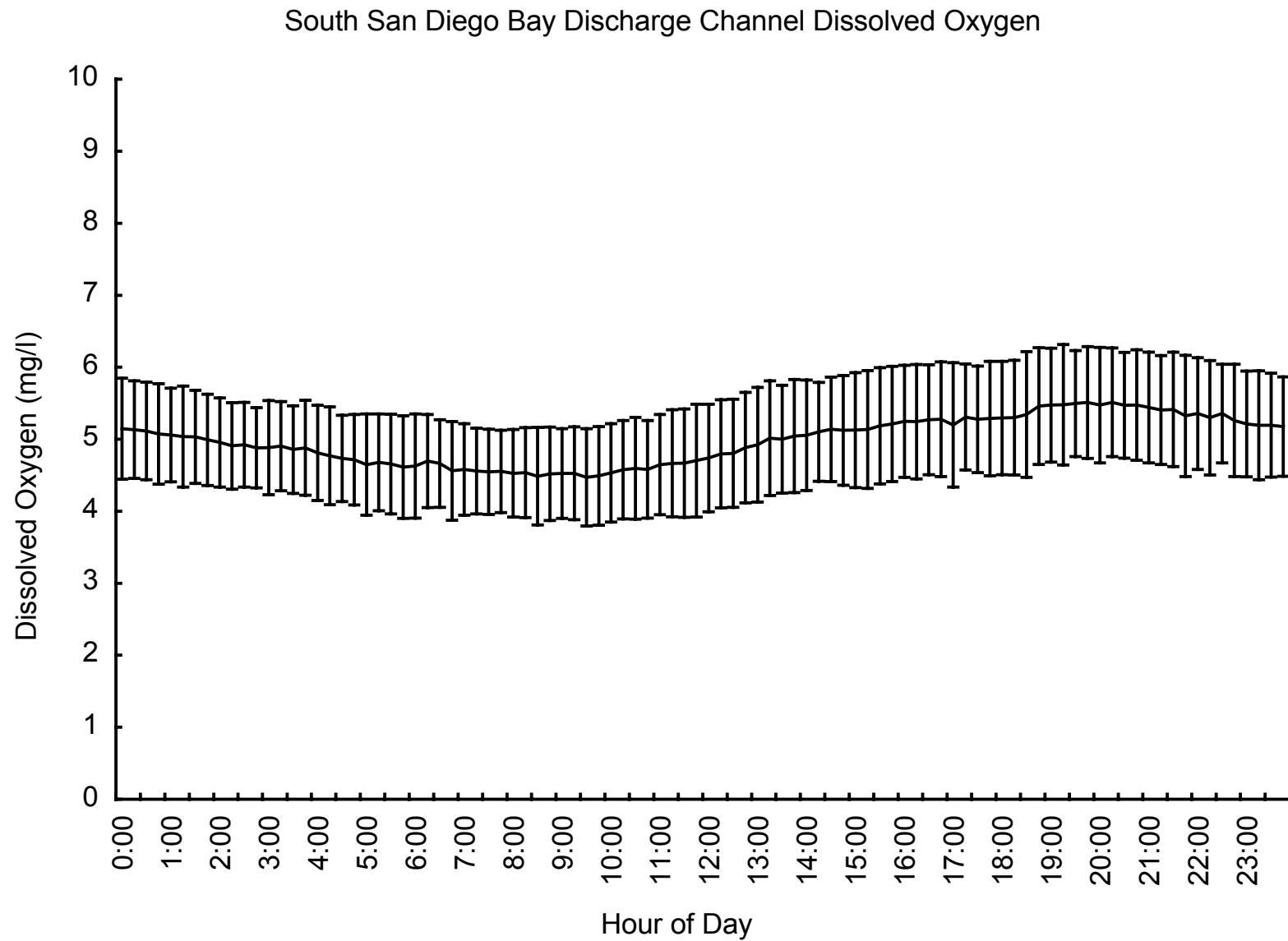
Station	Type	Hydrolab Multi-probe Deployment Dates–2003
1	DC	7/18 - 7/31; 8/5 - 8/8; 8/21 - 8/25; 8/29 - 9/3
2	OW	7/24 - 7/31; 8/8 - 8/13; 8/21 - 8/25; 9/3 - 9/10
3	DC	7/3 - 7/14; 7/24 - 7/31; 8/8 - 8/13; 8/21 - 8/25; 9/11 - 9/15
4	OW	8/1 - 8/5; 8/13 - 8/18; 8/26 - 8/29; 9/11 - 9/15
5	OW	7/3 - 7/14; 8/1 - 8/5; 8/13 - 8/18; 8/26 - 8/29; 9/11 - 9/15
6	OW	7/3 - 7/14; 8/1 - 8/5; 8/15 - 8/18; 8/26 - 8/29; 9/15 - 9/25
7	OW	7/3 - 7/14; 8/5 - 8/13; 8/15 - 8/18; 9/3 - 9/10; 9/15 - 9/25
8	OW	7/18 - 7/24; 8/5 - 8/8; 8/21 - 8/25; 9/3 - 9/10; 9/15 - 9/25

**Table E1b.** Hydrolab Multiprobe deployment periods for each of the four dissolved oxygen reference stations.

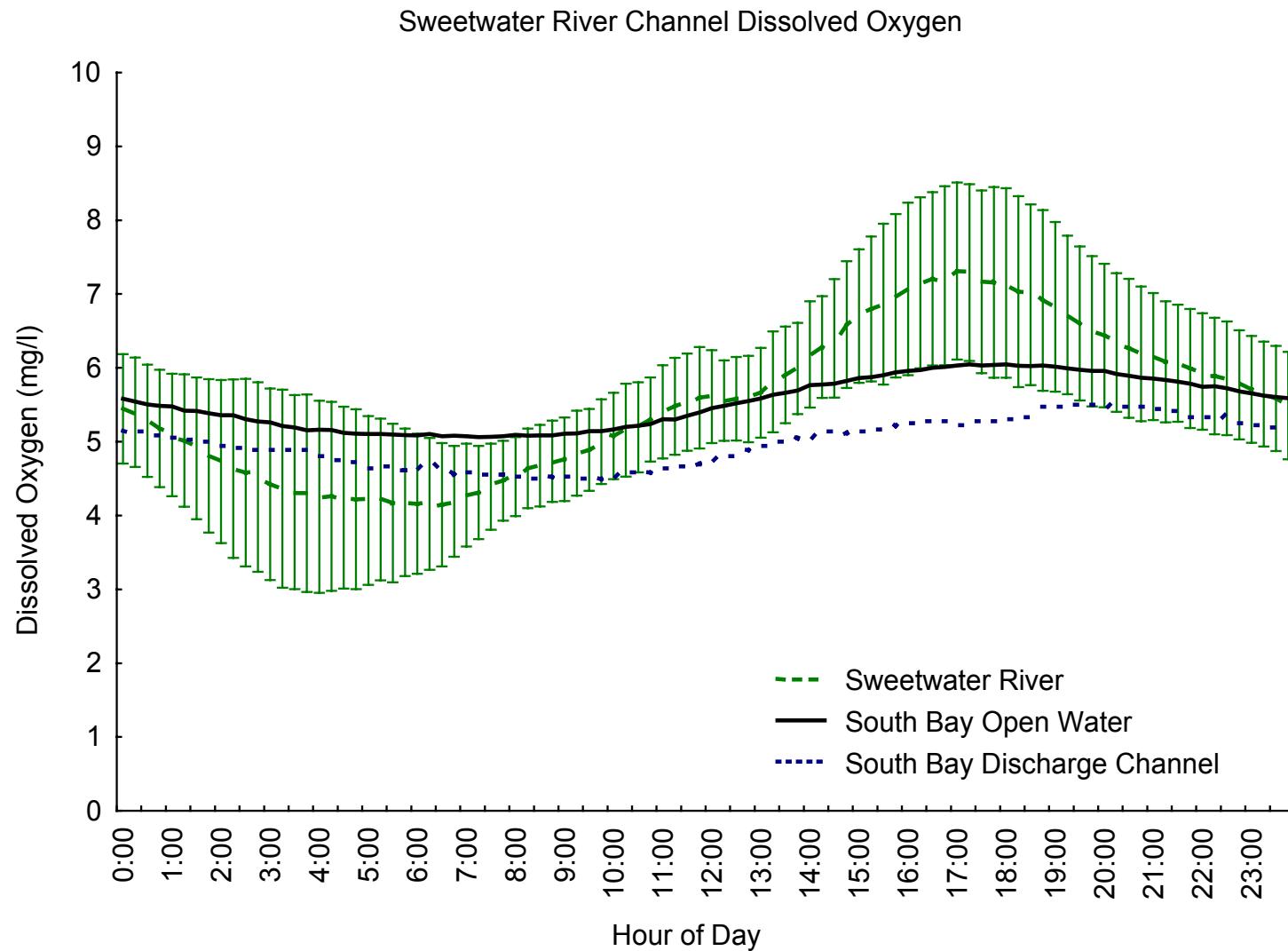
Reference DO Station	Multi-probe Deployment Dates–2003
Agua Hedionda (AH)	8/18 - 8/28; 9/3 - 9/23
Batiquitos Lagoon (Bat)	8/20 - 9/12
Seal Beach NWR (SB)	8/19 - 9/23
Sweetwater River (SW)	8/5 - 8/18; 8/29 - 9/25



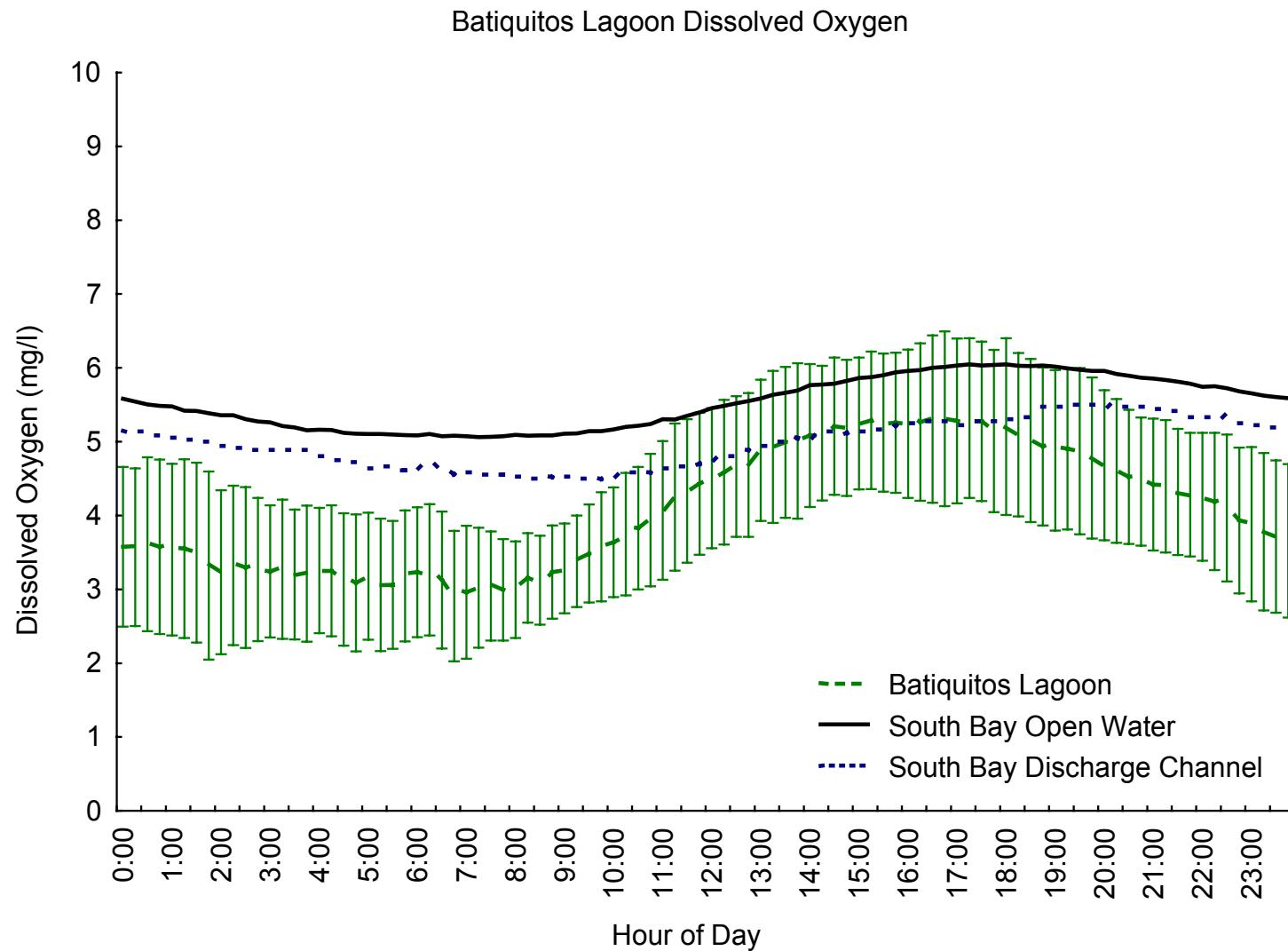
**Figure E1.** Mean hourly dissolved oxygen curve for the South San Diego Bay open water monitoring stations. Error bars are  $\pm 1$  standard deviation.



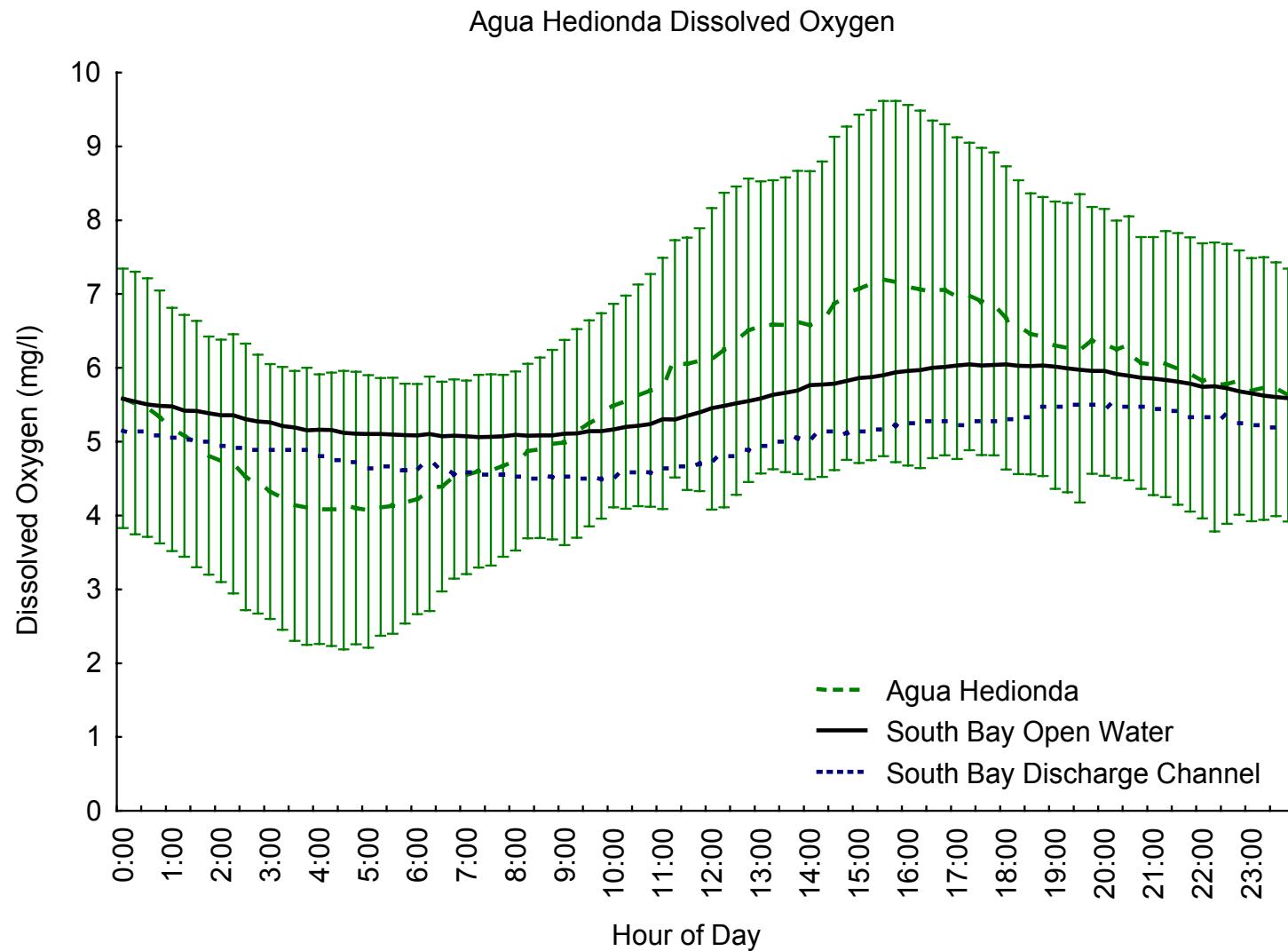
**Figure E2.** Mean hourly dissolved oxygen curve for the San Diego Bay discharge channel monitoring stations. Error bars are  $\pm 1$  standard deviation.



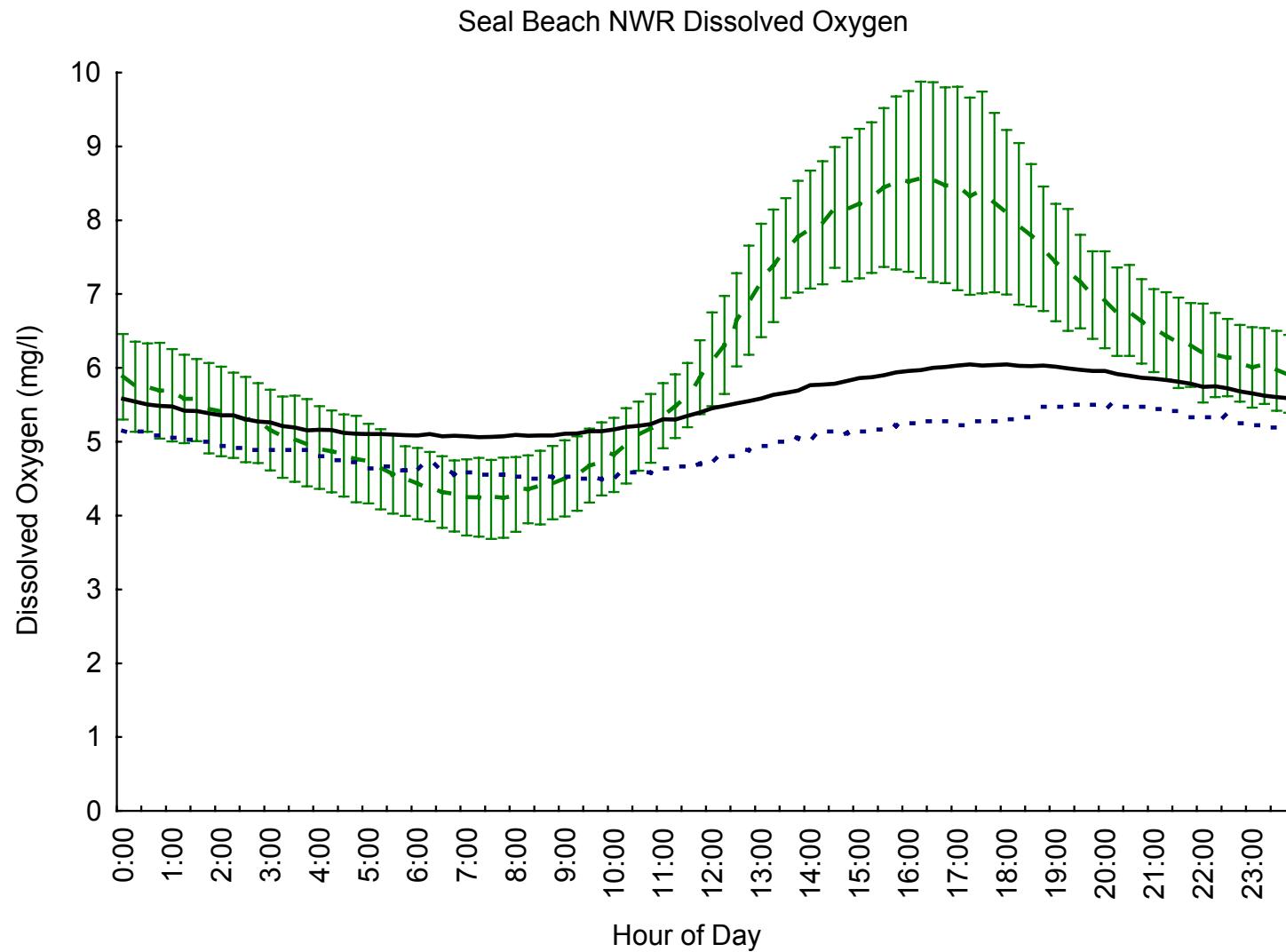
**Figure E3.** Mean hourly dissolved oxygen curve for the Sweetwater River monitoring station. Error bars are  $\pm 1$  standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.



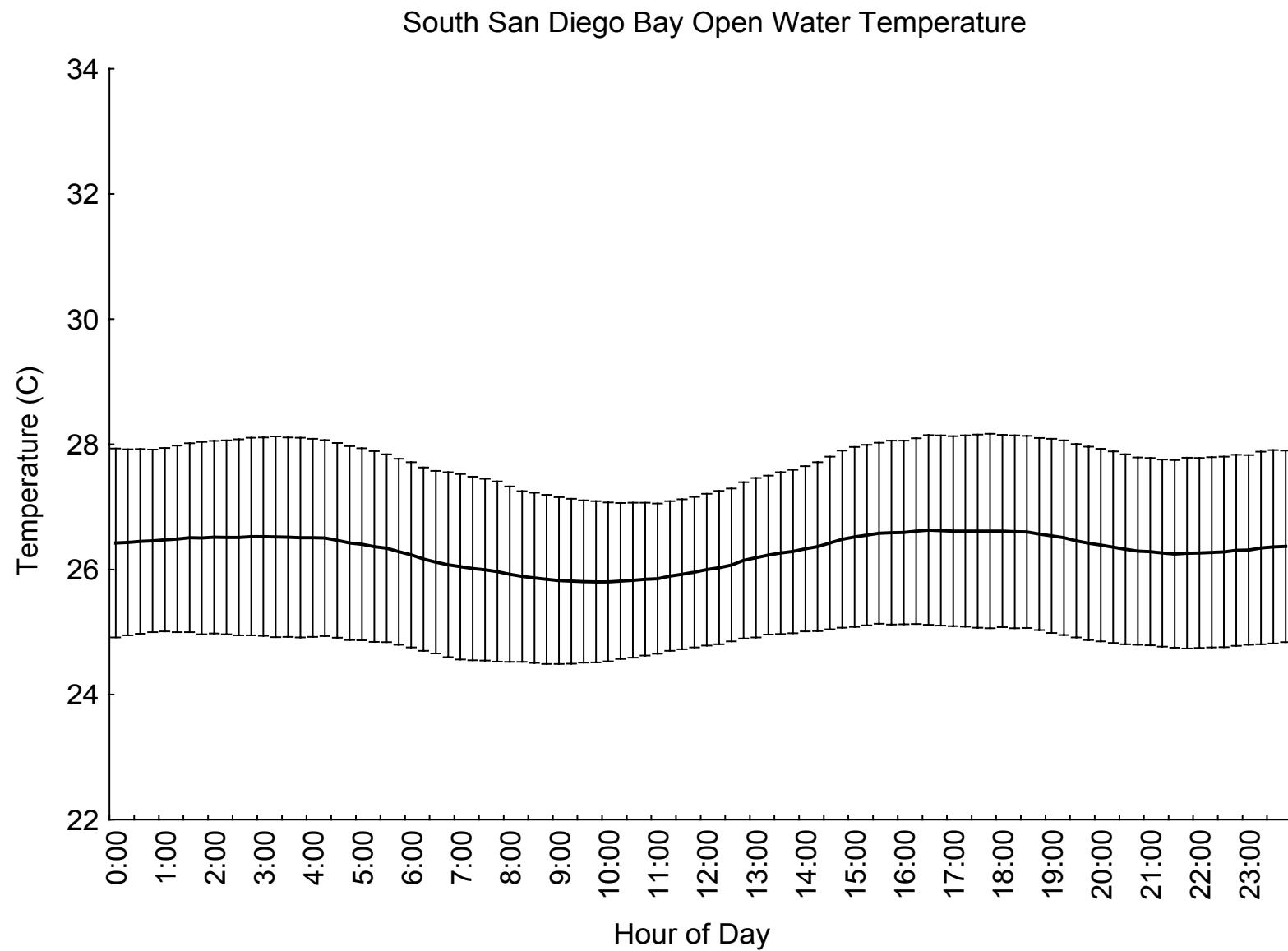
**Figure E4.** Mean hourly dissolved oxygen curve for the Batiquitos Lagoon monitoring station. Error bars are  $\pm 1$  standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.



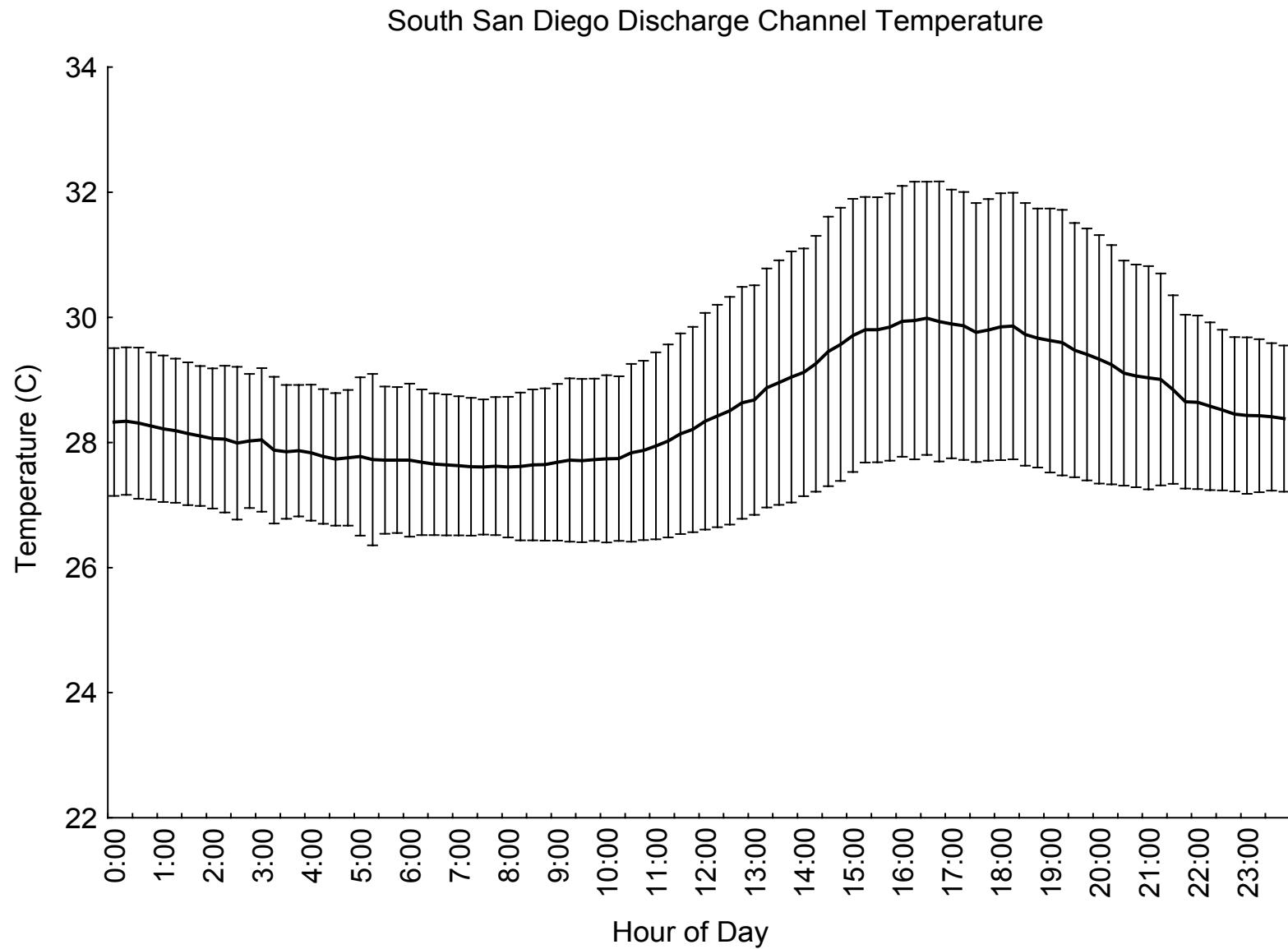
**Figure E5.** Mean hourly dissolved oxygen curve for the Agua Hedionda monitoring station. Error bars are  $\pm 1$  standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.



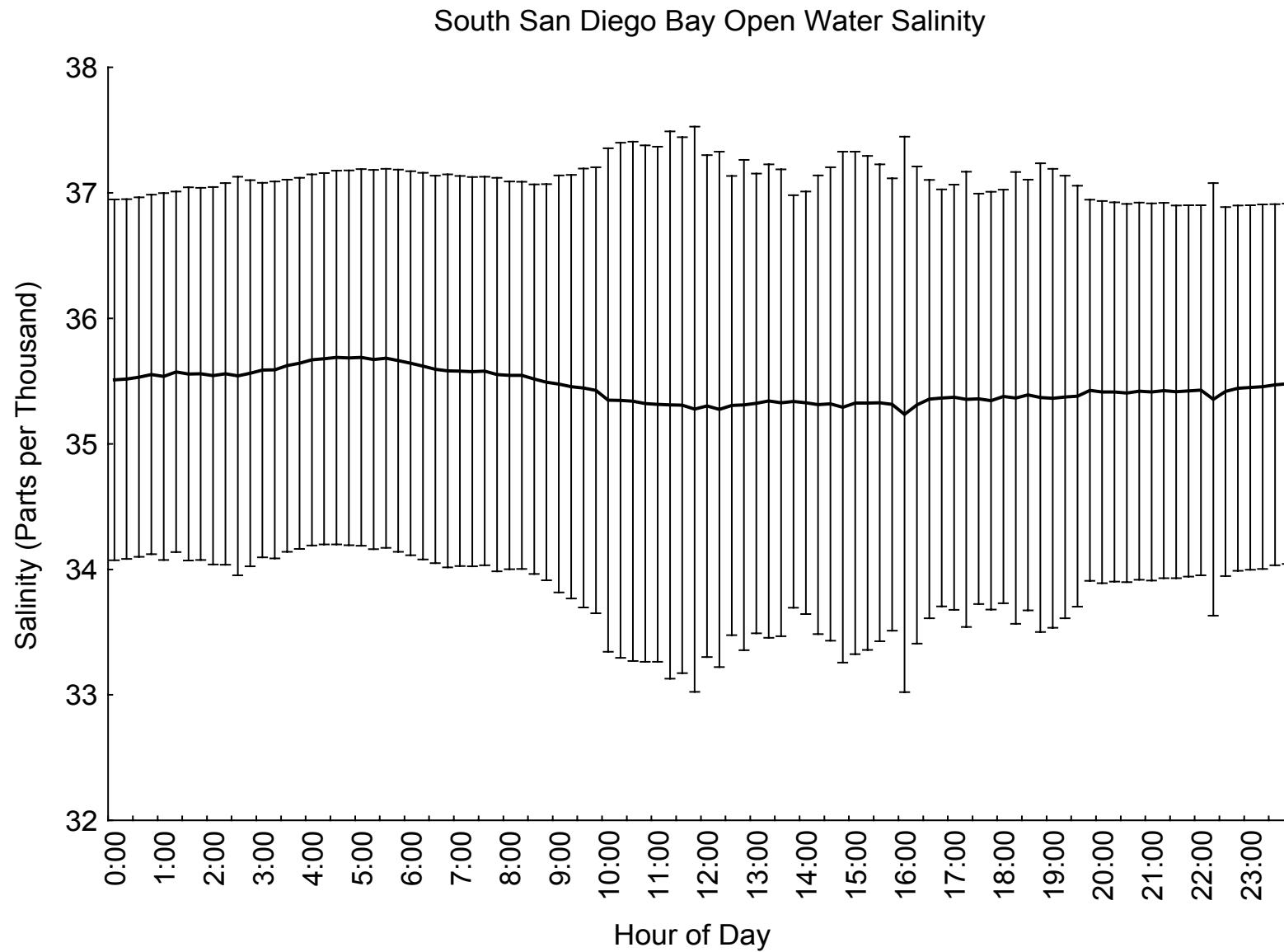
**Figure E6.** Mean hourly dissolved oxygen curve for the Seal Beach NWR monitoring station. Error bars are  $\pm 1$  standard deviation. Mean hourly dissolved oxygen curves for the South Bay open water and discharge channel data included for comparison.



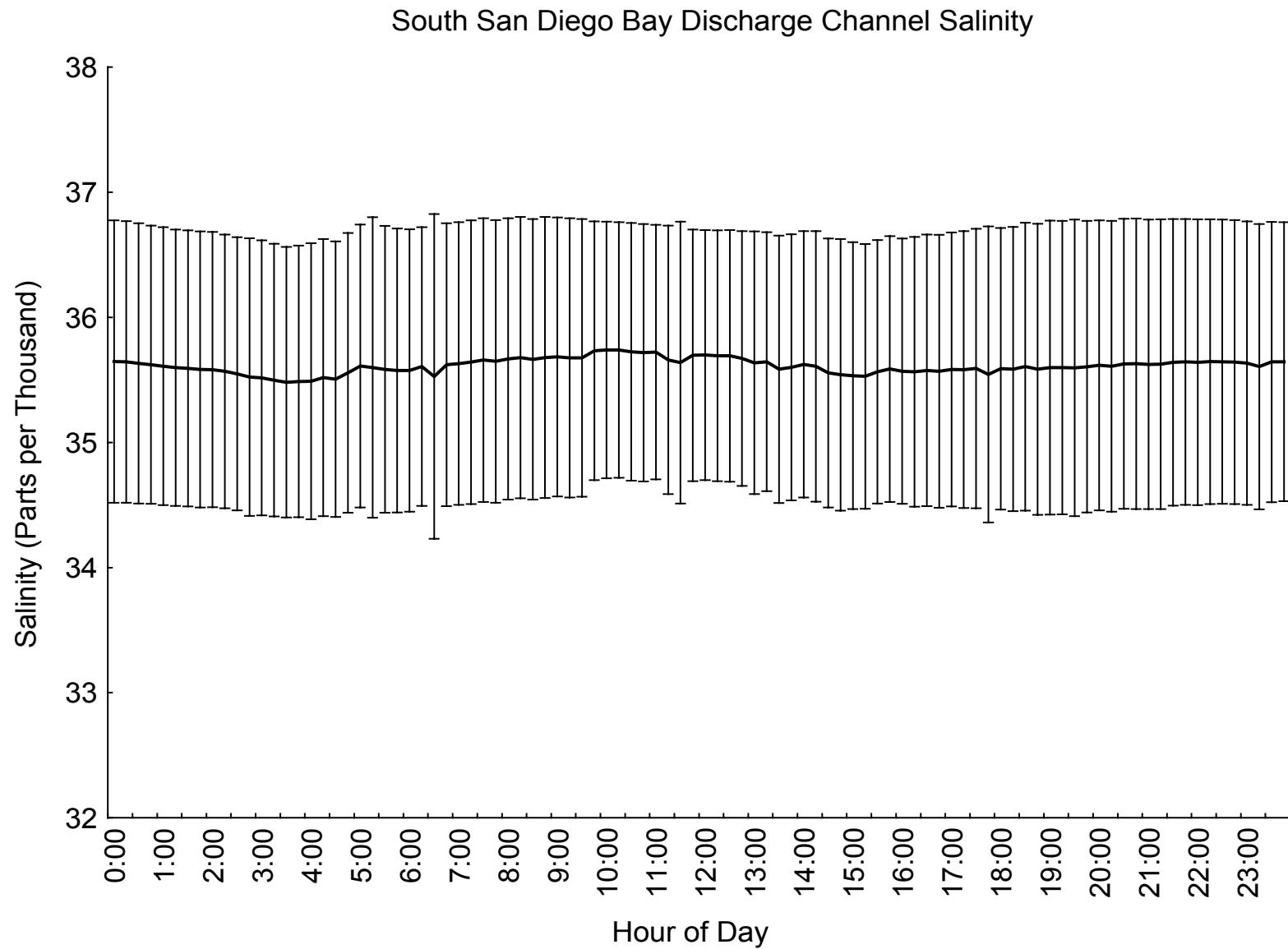
**Figure E7.** Mean hourly temperature curve for South San Diego Bay open water monitoring stations. Error bars are  $\pm 1$  standard deviation.



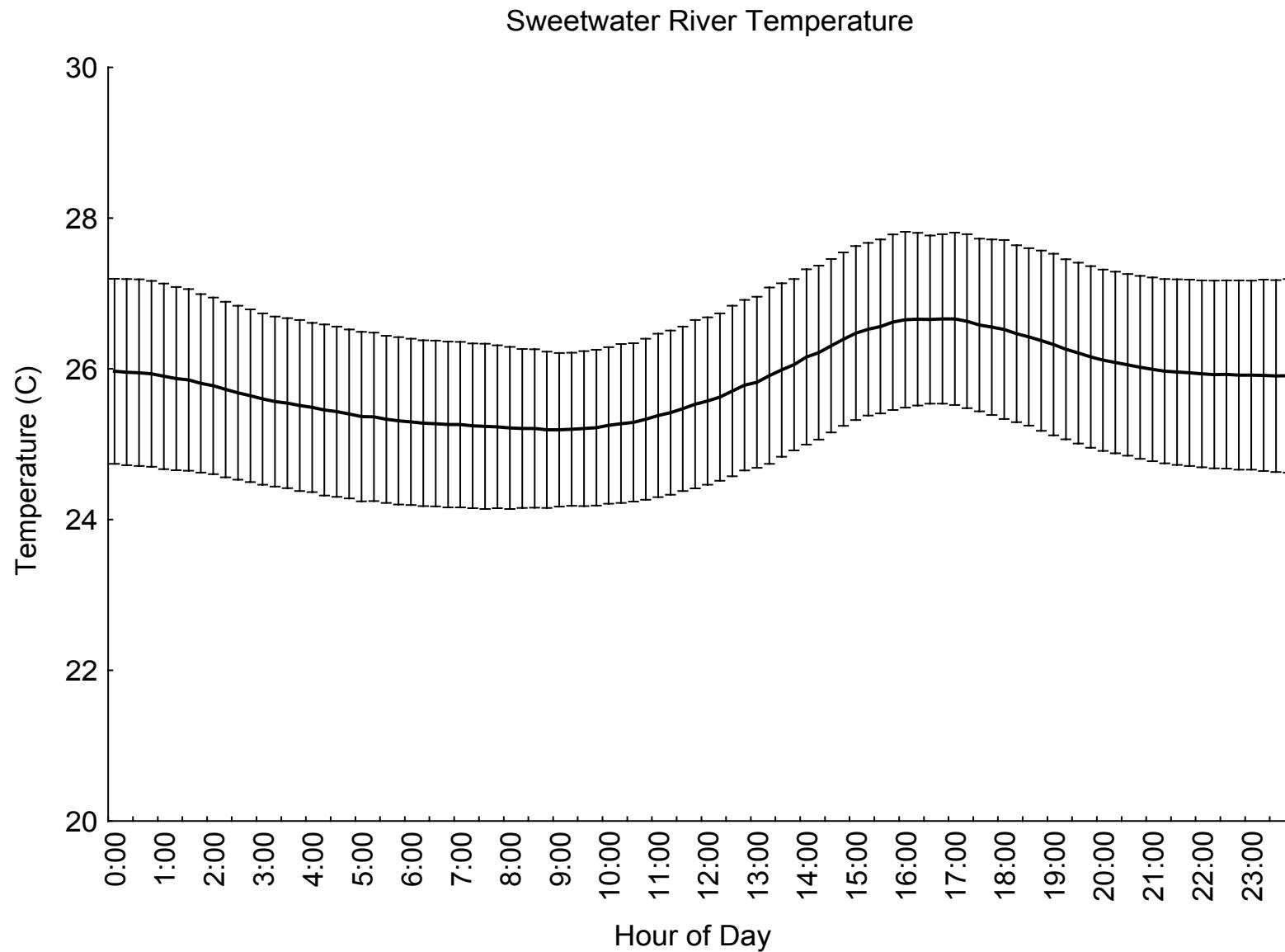
**Figure E8.** Mean hourly temperature curve for the South San Diego Bay discharge channel monitoring stations. Error bars are  $\pm 1$  standard deviation.



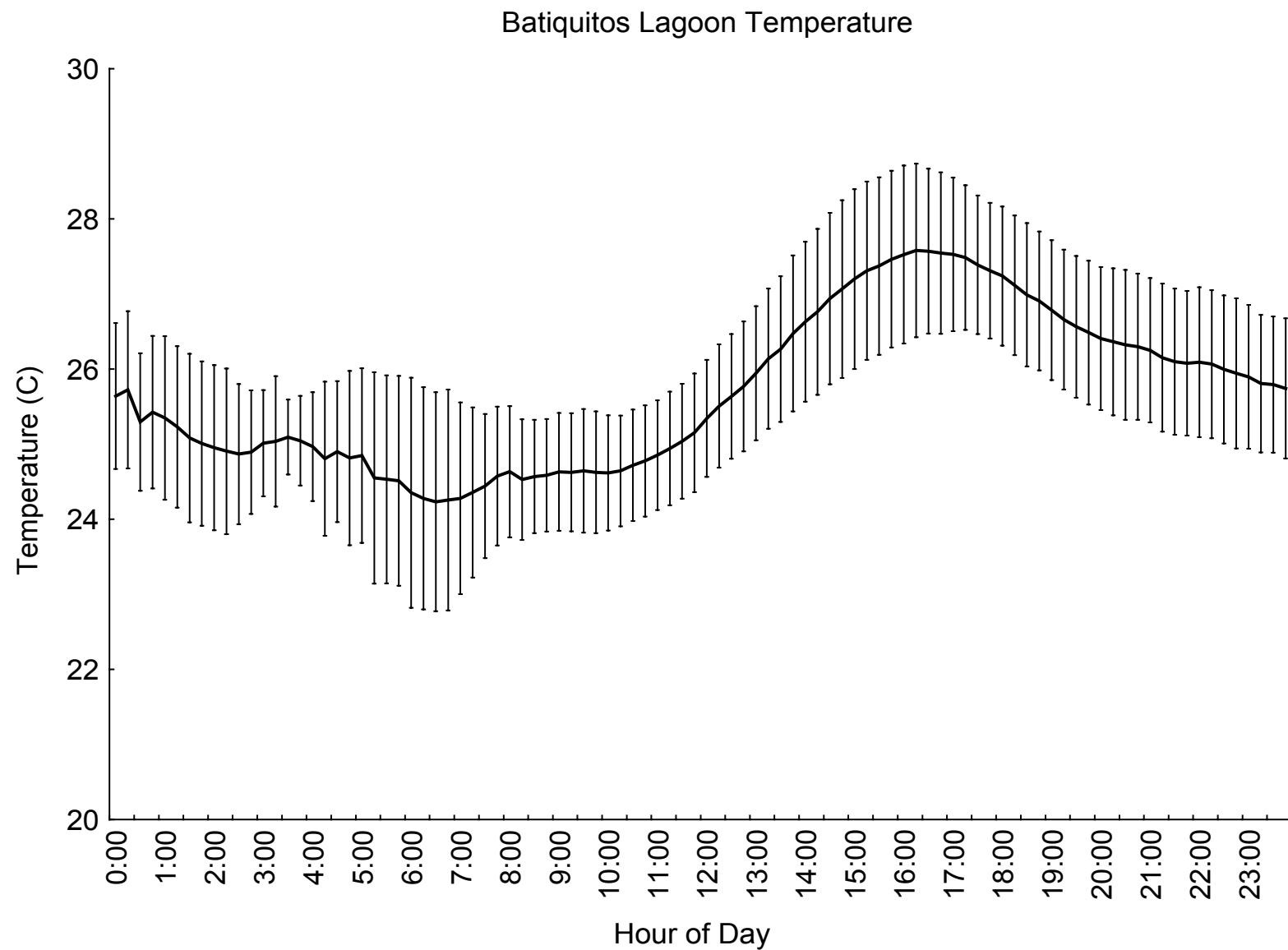
**Figure E9.** Mean hourly salinity curve for South San Diego Bay open water monitoring stations. Error bars are  $\pm 1$  standard deviation.



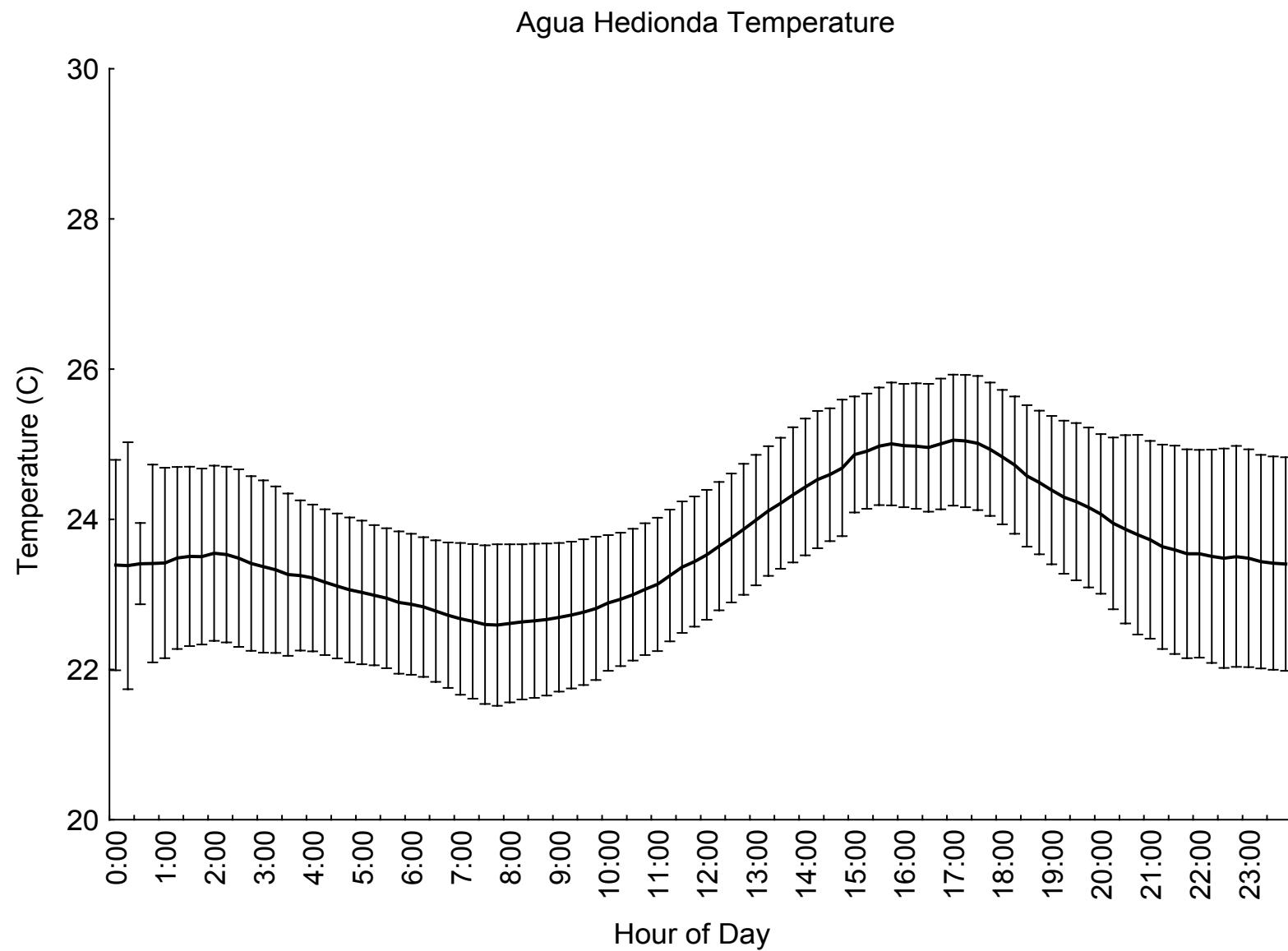
**Figure E10.** Mean hourly salinity curve for the South San Diego Bay discharge channel monitoring stations. Error bars are  $\pm 1$  standard deviation.



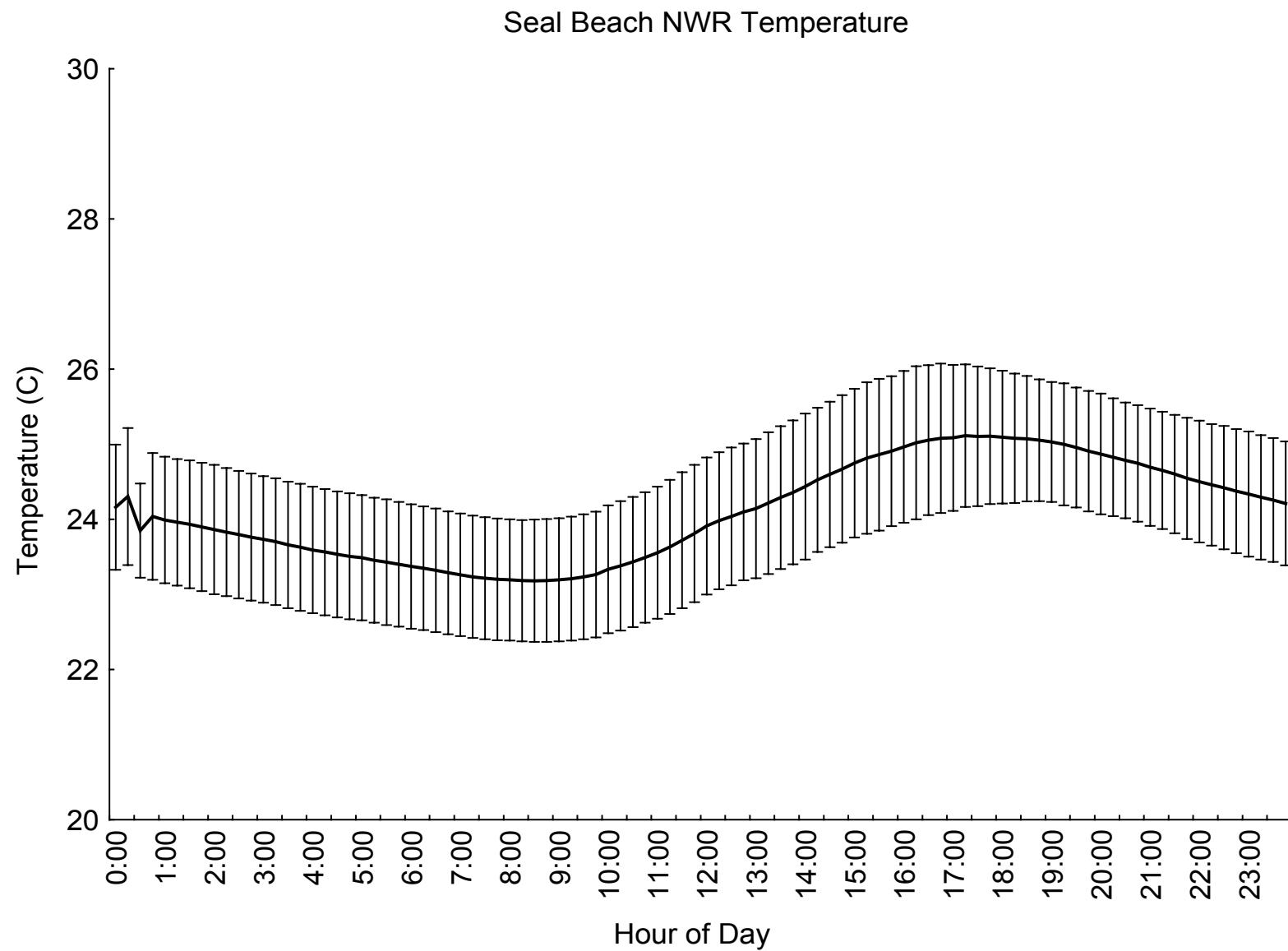
**Figure E11.** Mean hourly temperature curve for the Sweetwater River monitoring station. Error bars are  $\pm 1$  standard deviation.



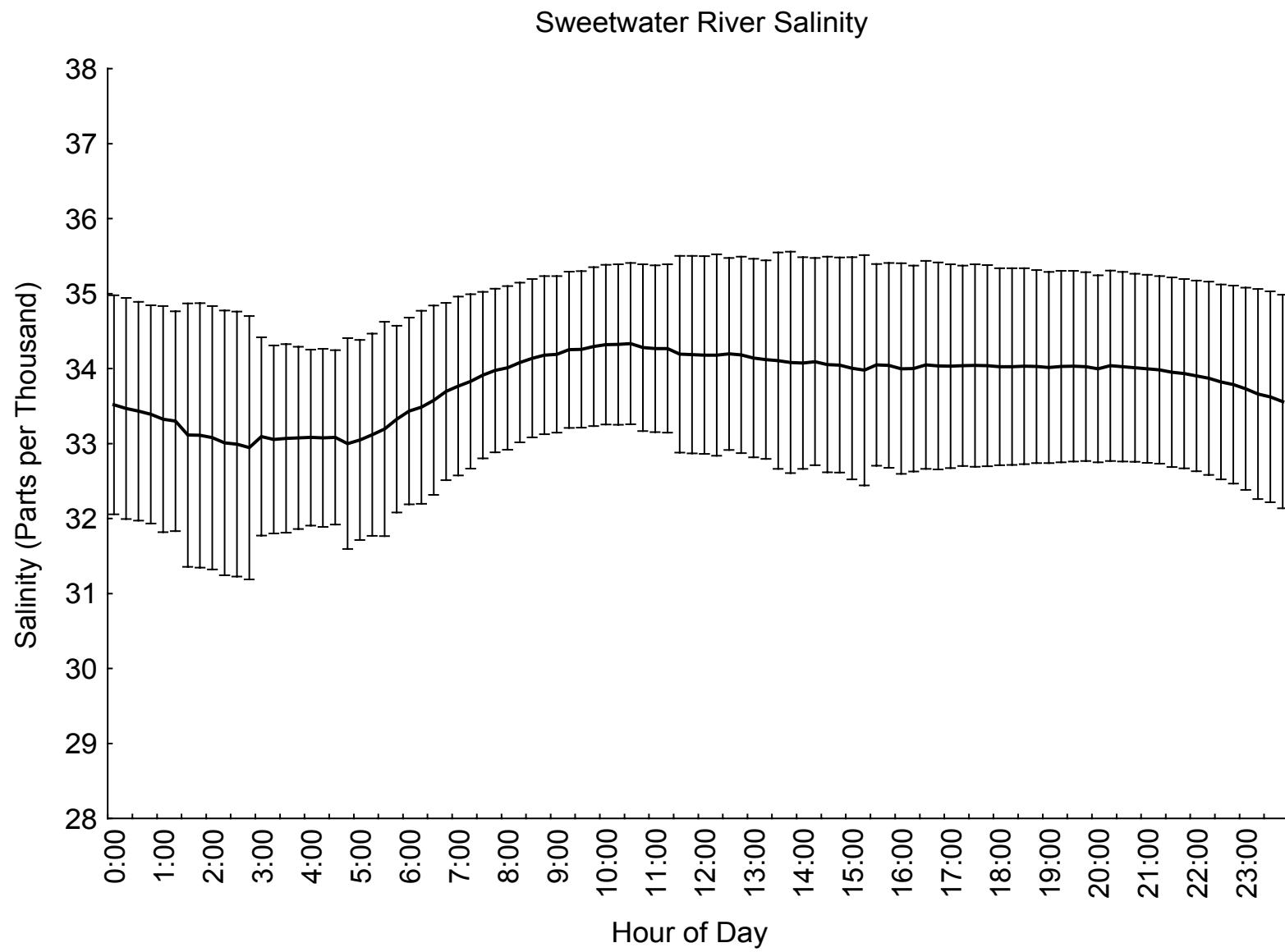
**Figure E12.** Mean hourly temperature curve for the Batiquitos Lagoon monitoring station. Error bars are  $\pm 1$  standard deviation.



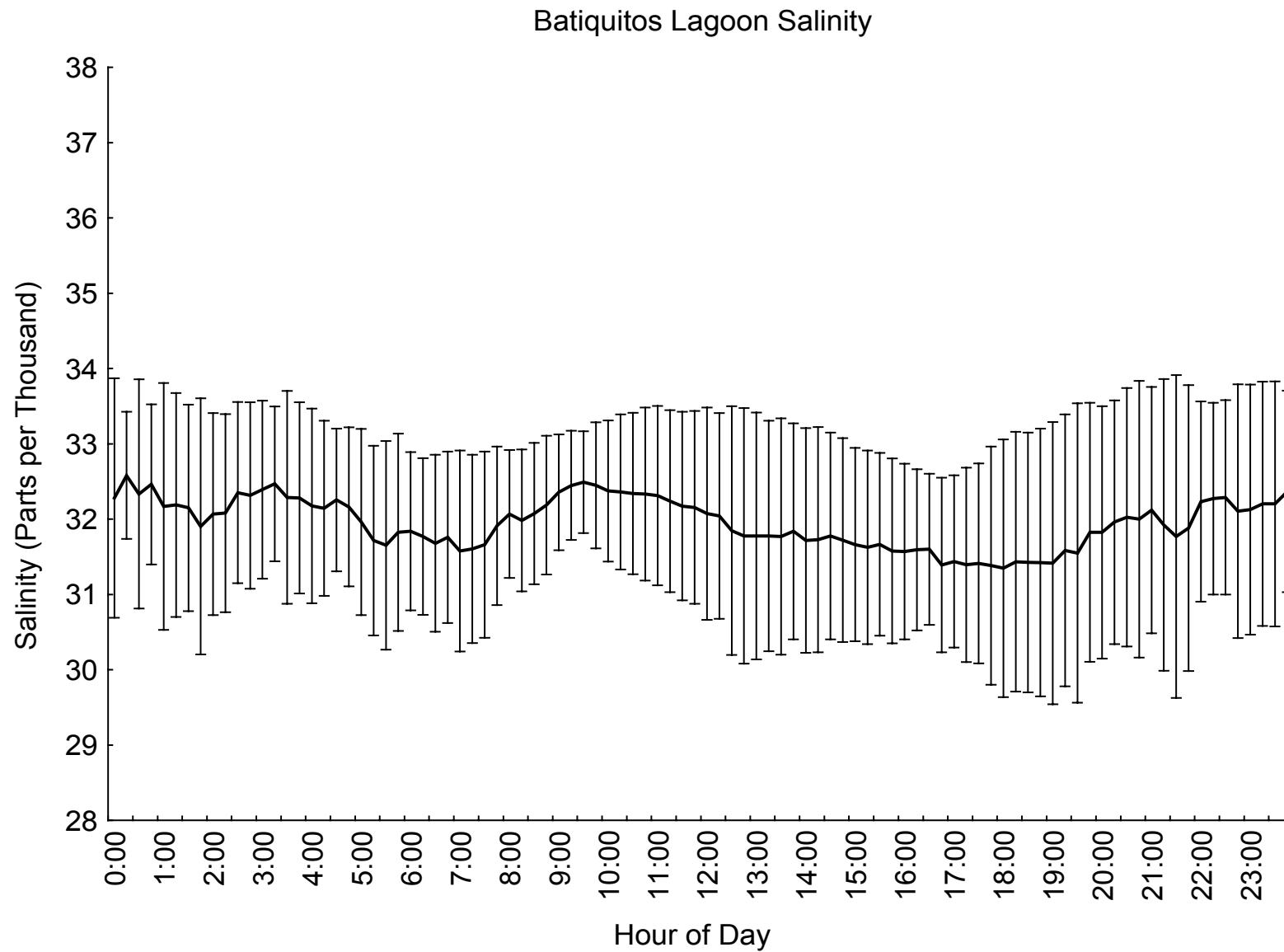
**Figure E13.** Mean hourly temperature curve for the Aqua Hedionda monitoring station. Error bars are  $\pm 1$  standard deviation.



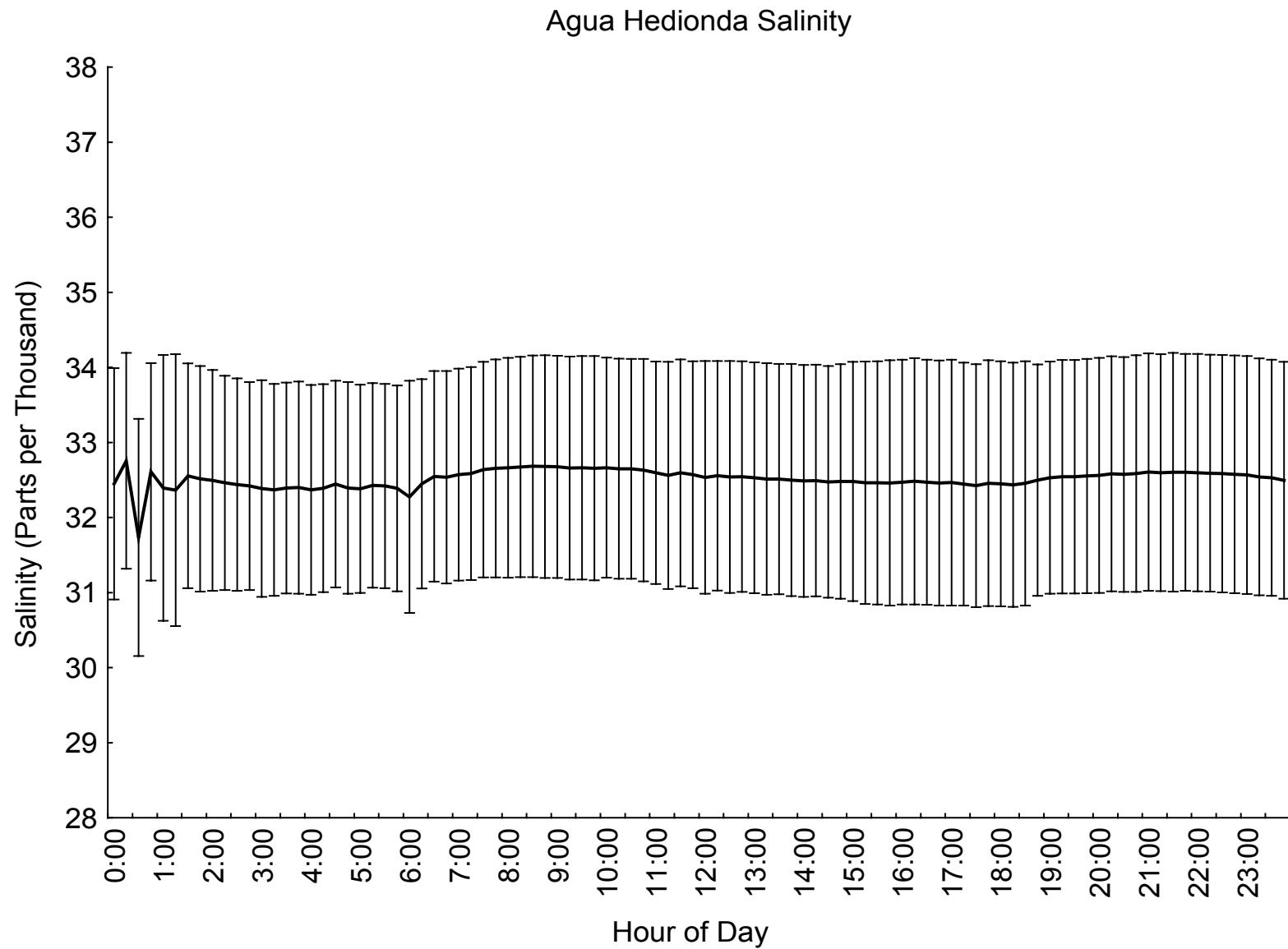
**Figure E14.** Mean hourly temperature curve for the Seal Beach NWR monitoring station. Error bars are  $\pm 1$  standard deviation.



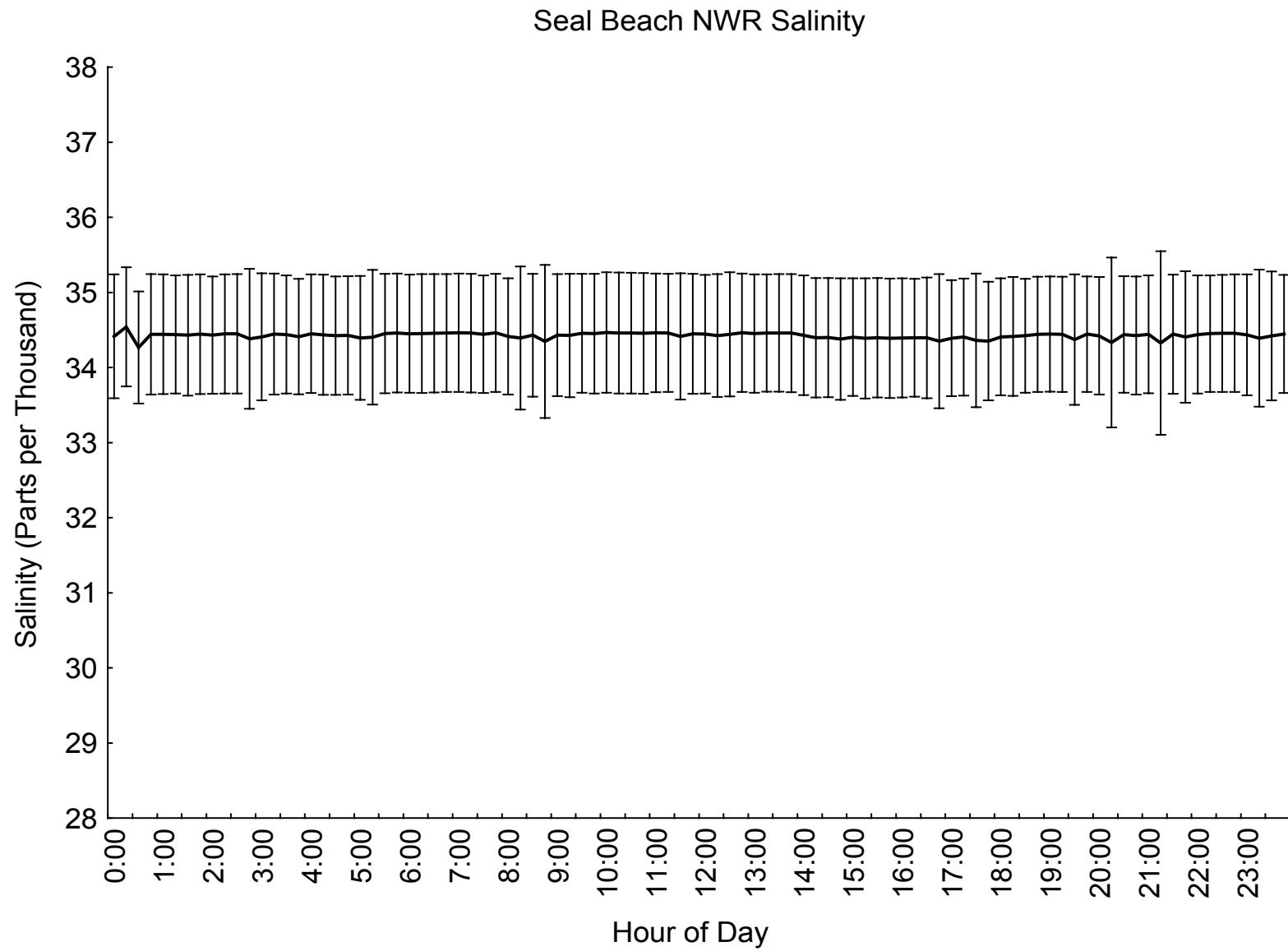
**Figure E15.** Mean hourly salinity curve for the Sweetwater River monitoring station. Error bars are  $\pm 1$  standard deviation.



**Figure E16.** Mean hourly salinity curve for the Batiquitos Lagoon monitoring station. Error bars are  $\pm 1$  standard deviation.



**Figure E17.** Mean hourly salinity curve for the Agua Hedionda monitoring station. Error bars are  $\pm 1$  standard deviation.



**Figure E18.** Mean hourly salinity curve for the Seal Beach NWR monitoring station. Error bars are  $\pm 1$  standard deviation.

# **Appendix F**

Station Acoustic Doppler Profiler (ADCP) Average and Depth Bin  
Current Speed and Direction Estimates August 4–5, 2003

**Table F1.** Station Acoustic Doppler Profiler (ADCP) Average and Depth Bin Current Speed and Direction Estimates August 4–5, 2003.

Date 2003 PST	Time	Station	North Latitude	East Longitude	Discharge Volume (mgh)	Average Current Speed (cm s <sup>-1</sup> )	Average Current Heading (°T)	Depth (m)		0.30	0.30	0.50	0.50
								Bottom Depth (m)	Current Speed (cm s <sup>-1</sup> )	Direction (°T)	Speed (cm s <sup>-1</sup> )	Direction (°T)	
8/4	17:28	E3	32.61478	-117.11884	14.5	13.6	5.2	2.0	14.3	4.6	15.9	3.5	
8/4	17:55	E4	32.61442	-117.11453	14.5	6.4	26.6	1.8	5.9	24.1	7.1	28.5	
8/4	18:28	CP6	32.61296	-117.10152	14.5	7.6	274.1	0.8	8.2	273.1	7.8	274.8	
8/4	19:06	M18	32.61272	-117.10433	14.5	14.4	255.8	1.5	16.6	256.6	17.3	250.9	
8/4	19:25	T3	32.61217	-117.10696	14.5	1.6	244.9	1.2	0.1	214.6	0.7	60.6	
8/4	19:50	F4	32.60892	-117.11396	14.5	26.0	252.1	1.8	30.2	235.2	29.5	239.0	
8/5	9:03	E4	32.61421	-117.11451	14.5	2.4	58.5	1.6	4.4	81.1	1.9	135.5	
8/5	9:24	E3	32.61452	-117.11889	14.5	3.3	149.3	1.7	4.7	117.9	3.5	100.9	
8/5	9:49	F3	32.61024	-117.11612	14.5	2.7	151.3	2.0	5.1	104.4	4.8	145.2	
8/5	10:05	F4	32.60907	-117.11427	14.5	7.4	114.7	2.3	9.9	131.0	10.4	120.7	
8/5	10:21	CP12	32.60674	-117.11400	14.5	6.3	139.6	1.2	6.8	136.3	6.8	144.1	
8/5	10:34	CP13	32.60660	-117.11644	14.5	5.6	131.2	1.4	7.8	116.7	6.5	123.1	
8/5	10:49	CP11	32.60459	-117.11670	14.5	2.2	138.4	1.2	4.5	129.1	0.9	198.4	
8/5	11:04	CP3	32.60429	-117.11372	14.5	5.3	144.3	1.2	8.5	147.7	4.0	152.2	
8/5	11:29	CP9	32.60482	-117.11044	14.5	2.8	97.6	0.8	2.9	93.2	2.8	103.6	
8/5	11:47	CP8	32.60896	-117.11008	14.5	4.1	40.1	1.3	4.7	59.3	5.5	43.4	
8/5	12:08	T5	32.61367	-117.11317	14.5	4.7	282.2	2.6	8.1	286.2	4.6	287.5	
8/5	12:24	E5	32.61317	-117.11008	14.5	7.1	299.4	3.3	2.3	288.9	6.9	304.4	
8/5	12:47	T4	32.61230	-117.10724	14.5	1.0	292.1	1.9	3.1	174.0	1.8	326.7	
8/5	13:06	CP5	32.60806	-117.10665	14.5	3.2	38.4	1.2	4.2	55.7	2.9	30.8	
8/5	13:27	T3	32.61270	-117.10427	14.5	5.1	261.8	2.0	4.6	247.9	5.8	253.7	
8/5	13:44	M18	32.61182	-117.10380	14.5	2.0	318.3	1.4	1.8	284.9	4.1	359.3	
8/5	14:03	T2	32.61318	-117.10141	14.5	5.4	283.5	3.9	8.8	288.3	8.3	285.2	
8/5	14:22	E7	32.61334	-117.09906	14.5	11.3	259.5	3.4	16.0	260.8	14.2	262.3	
8/5	14:38	CP6	32.61260	-117.10151	14.5	6.4	291.8	1.4	5.4	275.1	6.8	284.8	
8/5	17:59	CP3	32.60416	-117.11382	18.6	5.5	333.5	1.3	5.2	355.5	6.6	330.0	
8/5	18:16	CP9	32.60471	-117.11018	18.6	1.6	89.0	0.8	1.1	104.8	2.3	79.4	
8/5	18:33	CP5	32.60812	-117.10648	18.6	1.6	289.9	0.8	1.3	136.9	4.4	297.6	
8/5	18:50	M18	32.61199	-117.10373	18.6	6.8	213.0	0.6	7.1	213.8			
8/5	19:06	CP6	32.61273	-117.10182	18.6	3.9	272.8	0.6	4.1	273.2			
8/5	19:22	E7	32.61338	-117.09899	18.6	13.0	265.6	2.4	17.7	269.4	16.1	275.4	
8/5	19:43	T2	32.61327	-117.10163	18.6	18.3	267.5	2.1	19.8	263.3	18.7	264.3	
8/5	19:59	T3	32.61278	-117.10440	18.6	25.1	253.4	2.1	27.6	252.4	26.2	249.8	
8/5	20:17	T4	32.61212	-117.10709	18.6	4.3	170.2	1.7	5.2	160.7	4.5	172.0	
8/5	20:40	CP8	32.60898	-117.11025	18.6	14.3	253.6	0.6	14.9	253.8			
8/5	20:57	E5	32.61321	-117.11011	18.6	12.6	287.7	1.6	13.4	283.0	13.7	285.8	
8/5	21:19	T5	32.61380	-117.11331	18.6	3.1	259.6	3.0	5.4	271.3	7.1	271.2	
8/5	21:38	F4	32.60908	-117.11419	18.6	26.1	264.1	1.9	27.7	266.6	28.5	263.8	
8/5	21:56	CP12	32.60663	-117.11382	18.6	2.4	287.7	0.6	2.5	286.7			
8/5	22:15	CP13	32.60664	-117.11652	18.6	5.7	153.4	0.8	6.4	154.7	5.3	151.8	
8/5	22:33	CP11	32.60458	-117.11673	18.6	4.9	301.2	0.6	5.0	302.2			
8/5	22:54	F3	32.61009	-117.11643	18.6	6.5	290.5	1.6	6.4	291.1	7.0	286.1	
8/5	23:15	E3	32.61445	-117.11917	18.6	6.3	128.6	1.4	8.9	117.8	5.7	124.3	
8/5	23:31	E4	32.61440	-117.11445	18.6	3.2	54.5	1.3	3.4	66.6	4.7	24.0	

**Table F1**(continued). Station Acoustic Doppler Profiler (ADCP)

Depth Bin (m)	0.70	0.70	0.90	0.90	1.11	1.11	1.31	1.31	1.51	1.51	1.72	1.72
	Speed (cm s <sup>-1</sup> )	Direction (°T)	Speed (cm s <sup>-1</sup> )	Direction (°T)	Speed (cm s <sup>-1</sup> )	Direction (°T)	Speed (cm s <sup>-1</sup> )	Direction (°T)	Speed (cm s <sup>-1</sup> )	Direction (°T)	Speed (cm s <sup>-1</sup> )	Direction (°T)
E3	15.8	9.1	13.6	10.7	17.2	359.2	11.6	11.3	11.3	358.9		
E4	8.4	16.8	8.1	9.8	6.6	15.5	5.6	13.7				
CP6												
M18	12.6	259.0	14.9	258.8								
T3	4.6	81.2										
F4	29.9	253.4	29.1	255.0	26.3	264.8	24.0	270.0				
E4	3.7	47.3	3.3	43.8	2.4	338.6						
E3	4.0	150.1	4.5	177.8	4.6	164.3	2.6	172.1				
F3	3.7	167.9	2.9	146.5	3.6	134.9	1.4	261.8	2.7	197.9		
F4	6.5	116.1	8.7	132.9	8.2	107.9	6.2	95.0	6.6	95.8	7.0	98.3
CP12	6.6	138.2										
CP13	6.3	149.1	3.8	143.6								
CP11	2.5	143.5										
CP3	4.3	129.3										
CP9												
CP8	2.7	16.0	5.2	35.2								
T5	6.9	282.1	6.8	274.4	7.2	278.5	5.1	273.8	2.0	288.1	2.3	291.5
E5	5.2	284.3	7.1	304.7	9.1	300.5	6.7	304.0	6.9	300.0	8.8	309.9
T4	3.3	274.7	1.5	251.8	1.7	324.8	2.7	10.3				
CP5	3.7	20.8										
T3	6.1	250.5	5.3	258.3	6.4	280.5	5.7	272.5	4.2	270.2		
M18	1.9	296.3	1.9	315.5								
T2	9.3	284.6	7.8	282.2	6.3	287.4	4.1	288.7	6.2	270.7	5.6	279.5
E7	14.2	259.8	14.3	257.7	11.7	257.2	12.8	256.5	13.3	257.1	11.0	263.7
CP6	9.3	287.0	6.7	314.7								
CP3	6.3	329.4	5.2	315.2								
CP9												
CP5												
M18												
CP6												
E7	16.8	270.0	15.8	274.4	16.2	264.0	13.1	256.2	11.0	254.4	8.1	258.9
T2	18.4	270.3	20.2	269.8	20.1	264.1	19.8	273.4	18.1	271.4		
T3	28.5	253.4	26.6	253.4	25.5	255.6	25.9	254.0	24.1	255.7	24.4	254.1
T4	5.7	171.2	3.4	174.6	4.2	172.2						
CP8												
E5	14.5	288.6	13.3	292.6								
T5	5.7	261.6	4.3	265.4	3.5	227.9	3.6	200.5	3.8	226.5	0.5	14.3
F4	28.4	264.3	27.1	261.3	26.3	261.9	27.4	266.8				
CP12												
CP13												
CP11												
F3	7.4	296.9	7.9	283.8	5.3	296.1						
E3	5.2	133.3	7.1	143.8								
E4	3.3	63.7	2.3	63.3								

**Table F1**(continued). Station Acoustic Doppler Profiler (ADCP)

<i>Depth Bin (m)</i>	1.92	1.92	2.12	2.12	2.32	2.32	2.52	2.52	2.73	2.73	2.93	2.93	3.13	3.13
Station	Speed (cm s <sup>-1</sup> )	Dir (°T)												
E3														
E4														
CP6														
M18														
T3														
F4														
E4														
E3														
F3														
F4														
CP12														
CP13														
CP11														
CP3														
CP9														
CP8														
T5	1.5	296.1												
E5	7.6	299.7	9.1	297.9	9.3	293.3	10.6	297.7						
T4														
CP5														
T3														
M18														
T2	6.4	287.6	6.6	270.6	7.2	297.1	5.2	285.9	2.4	223.6	1.3	230.0	1.7	9.7
E7	11.3	261.2	13.5	259.5	9.9	236.3	9.1	271.0	3.4	279.6				
CP6														
CP3														
CP9														
CP5														
M18														
CP6														
E7	8.1	248.9												
T2														
T3														
T4														
CP8														
E5														
T5	2.0	323.0	2.6	289.5	2.9	270.9								
F4														
CP12														
CP13														
CP11														
F3														
E3														
E4														

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# **Appendix G**

Hourly Acoustic Doppler Profiler (ADP) Average and

Depth Bin Current Speed and Direction Estimates

July 17 – August 14, 2003

**Table G1.** Hourly Acoustic Doppler Profiler (ADP) Average and Depth Bin Current Speed and Direction Estimates July 17–August 14, 2003. Station located in SBPP discharge channel (N 32.61194, E -117.10610); bottom depth 2.4 m.

Date (2003)	Hour (PST)	Average Speed Direction		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]							Current Direction (°T) [Depth Bin (m MLLW)]											
		(cm s <sup>-1</sup> )	(°T)	-1.1	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1	-1.1	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1	
17 Jul	15:00	7	223	7	6	7	11	24	20				78	120	253	246	227	222				
17 Jul	16:00	20	232	18	14	26	24	27					242	229	233	226	236					
17 Jul	17:00	27	232	28	24	28	23						231	234	230	232						
17 Jul	18:00	25	236	24	25	27	22						237	232	239	233						
17 Jul	19:00	20	227	17	18	24	19	20					230	232	223	225	227					
17 Jul	20:00	11	216	9	11	15	10	10	3				186	225	226	216	217	219				
17 Jul	21:00	7	101	7	9	7	4	7	11	4			100	90	83	56	95	141	179			
17 Jul	22:00	6	210	3	9	5	6	7	7	8			252	199	220	205	201	212	153			
17 Jul	23:00	10	213	6	10	12	13	11	11	11	14		244	232	207	227	204	209	181	94		
18 Jul	0:00	12	235	17	12	16	14	8	7	8	11		241	225	248	234	234	221	227	90		
18 Jul	1:00	13	228	17	14	15	13	14	9	11			210	244	239	195	242	238	223			
18 Jul	2:00	18	243	20	16	14	21	18	21	8			245	245	247	238	240	246	253			
18 Jul	3:00	31	238	30	31	32	30	30	8				236	239	244	237	235	283				
18 Jul	4:00	38	236	32	39	42	40	28					234	240	231	240	243					
18 Jul	5:00	47	240	45	45	52	42						240	239	240	240						
18 Jul	6:00	45	239	42	44	50	31						240	237	240	241						
18 Jul	7:00	42	238	43	40	45	16						241	232	240	236						
18 Jul	8:00	38	236	37	40	39	26						234	235	240	247						
18 Jul	9:00	26	232	25	20	28	30	5					239	236	226	231	268					
18 Jul	10:00	12	239	8	15	13	19						241	232	247	235						
18 Jul	11:00	17	229	15	19	18	18	20					238	228	219	231	236					
18 Jul	12:00	13	230	13	10	14	16	16	19				265	257	218	213	214	233				
18 Jul	13:00	19	234	19	20	16	20	20	18				238	238	239	222	237	246				
18 Jul	14:00	16	235	17	14	22	11	16	21	16			250	247	243	180	242	226	217			
18 Jul	15:00	7	247	2	2	11	7	14	16	10			77	23	271	256	233	235	166			
18 Jul	16:00	11	234	1	3	14	19	22	20				320	199	263	235	218	231				
18 Jul	17:00	14	224	2	15	12	22	21	6				156	210	210	241	231	191				
18 Jul	18:00	8	210	5	4	11	16	14					149	192	244	209	229					
18 Jul	19:00	23	226	21	22	28	21	22					236	227	217	227	224					
18 Jul	20:00	13	223	6	9	13	21	17	14				209	197	231	237	220	100				
18 Jul	21:00	2	28	2	7	6	1	2	3				54	56	345	212	197	283				
18 Jul	22:00	5	220	3	3	7	6	12	10				129	173	243	228	225	210				
18 Jul	23:00	12	240	14	13	8	15	15	8	3			235	241	242	249	234	236	131			
19 Jul	0:00	16	228	15	17	18	15	19	13	16			252	232	228	226	220	206	244			
19 Jul	1:00	19	235	20	19	21	16	21	18	16			247	253	226	230	233	219	216			
19 Jul	2:00	14	229	10	15	14	13	19	14	4			232	247	234	224	223	215	283			
19 Jul	3:00	14	230	12	16	16	15	14	9				233	246	206	238	226	244				
19 Jul	4:00	17	233	18	17	16	19	17					233	223	245	232	224					
19 Jul	5:00	24	235	21	23	25	26	13					232	241	232	237	228					
19 Jul	6:00	28	241	27	29	28	29						235	250	237	239						
19 Jul	7:00	36	241	35	38	35	18						239	243	240	243						
19 Jul	8:00	27	239	28	23	29	24						237	246	235	231						
19 Jul	9:00	15	235	20	11	13	15						237	224	240	240						
19 Jul	10:00	13	235	14	16	16	9	16					258	240	215	222	226					
19 Jul	11:00	12	207	13	10	9	17	14	3				220	190	213	208	203	135				
19 Jul	12:00	3	235	3	5	3	6	6	7				154	261	241	196	280	226				
19 Jul	13:00	7	248	9	4	4	9	12	9	8			257	263	286	223	229	267	217			
19 Jul	14:00	13	229	8	11	13	15	15	15	14			243	223	246	220	233	217	223			
19 Jul	15:00	10	240	9	8	10	9	14	11	3			234	254	262	235	230	228	228			
19 Jul	16:00	2	216	6	5	4	6	9	13				102	119	242	241	271	232				
19 Jul	17:00	5	205	1	7	3	11	9	16				283	170	181	202	237	233				
19 Jul	18:00	10	233	2	4	8	17	22	6				271	206	229	245	227	91				
19 Jul	19:00	10	222	4	11	13	16	25					154	232	238	218	222					
19 Jul	20:00	4	127	5	6	3	9	9	9				131	101	212	216	207					
19 Jul	21:00	2	198	4	3	5	7	11					118	103	230	235	282					
19 Jul	22:00	8	179	10	9	5	7	12	11				98	103	97	134	144	87				
19 Jul	23:00	7	211	4	7	11	10	8	11				180	242	178	231	217	236				
20 Jul	0:00	11	236	8	8	11	13	15	9				216	240	229	238	246	206				
20 Jul	1:00	16	234	16	18	15	16	15	10				230	242	231	221	245	212				
20 Jul	2:00	15	234	17	17	10	11	20	17				239	224	230	233	241	220				
20 Jul	3:00	16	241	18	19	14	20	10	17				244	235	231	248	245	221				
20 Jul	4:00	13	243	9	10	11	20	13	14				250	234	245	242	244	221				
20 Jul	5:00	18	238	23	11	16	25	23					245	228	243	232	255					
20 Jul	6:00	14	220	14	14	12	17	7					224	221	212	220	217					

Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]												
		cm s <sup>-1</sup>	°T	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]					
20 Jul	7:00	28	240	34	25	28	26	5					239	245	232	244	230									
20 Jul	8:00	16	230	15	13	21	16	9					243	233	229	218	100									
20 Jul	9:00	19	235	14	20	22	20	5					247	230	233	232	200									
20 Jul	10:00	18	239	16	13	19	26	16					242	224	235	246	230									
20 Jul	11:00	18	236	19	15	20	21	18	13				249	228	229	234	237	254								
20 Jul	12:00	9	210	10	11	9	10	7	8				229	199	223	209	184	200								
20 Jul	13:00	20	236	28	16	20	20	18	21				241	257	220	241	220	226								
20 Jul	14:00	18	233	20	18	16	17	19	18				225	229	240	226	245	242								
20 Jul	15:00	15	237	16	16	13	9	19	15				229	233	240	237	246	240								
20 Jul	16:00	17	240	17	15	20	17	16	19	18			231	228	238	260	243	241	244							
20 Jul	17:00	16	240	15	14	14	18	18	16	4			246	241	244	227	233	249	171							
20 Jul	18:00	23	246	24	21	23	24	20					259	235	245	245	230									
20 Jul	19:00	24	238	21	24	26	21	27	14				250	238	236	231	237	208								
20 Jul	20:00	22	238	20	20	24	22	25					238	244	235	237	244									
20 Jul	21:00	13	229	16	11	13	14	20					223	253	228	220	239									
20 Jul	22:00	20	248	24	16	19	21	24					250	238	259	242	231									
20 Jul	23:00	18	249	18	14	21	20	19					245	248	252	252	245									
21 Jul	0:00	12	224	10	10	13	14	16	6				233	226	217	212	232	233								
21 Jul	1:00	14	226	15	17	13	10	14	14				227	216	222	232	239	200								
21 Jul	2:00	13	232	14	15	15	10	13	17				212	233	236	223	254	255								
21 Jul	3:00	14	231	9	16	14	13	21	10				200	223	242	242	234	254								
21 Jul	4:00	13	228	13	18	13	10	14	21				209	223	236	240	237	249								
21 Jul	5:00	12	229	14	11	11	13	11	13				235	234	206	222	245	249								
21 Jul	6:00	24	235	24	29	22	23	18					231	243	228	235	246									
21 Jul	7:00	20	239	23	15	21	22	23					240	252	233	234	240									
21 Jul	8:00	8	215	10	2	11	12	9					205	253	227	205	246									
21 Jul	9:00	21	235	21	18	18	27	18					225	228	239	244	239									
21 Jul	10:00	26	236	25	24	29	34						241	222	242	235										
21 Jul	11:00	18	239	15	18	22	19	29					245	236	240	236	232									
21 Jul	12:00	6	225	7	9	10	2	9	13				251	258	165	161	236	241								
21 Jul	13:00	7	239	7	9	4	8	4	13	10			215	242	255	253	218	243	147							
21 Jul	14:00	3	230	3	5	1	5	4	11	8			351	201	80	211	192	254	227							
21 Jul	15:00	1	194	1	7	5	3	4	10	14			142	80	83	232	262	235	235							
21 Jul	16:00	5	265	2	3	7	5	6	10	14			269	238	279	298	272	243	237							
21 Jul	17:00	8	259	1	9	5	5	11	20	27			62	285	299	276	253	237	237							
21 Jul	18:00	12	228	7	2	7	11	24	26	10			268	200	253	205	233	217	192							
21 Jul	19:00	16	227	6	7	21	21	24	21				223	216	229	237	222	233								
21 Jul	20:00	20	235	17	17	24	22	18	10				238	243	233	225	238	257								
21 Jul	21:00	25	239	27	21	27	28	25					243	236	240	237	249									
21 Jul	22:00	31	241	33	29	31	31	29					245	234	239	244	231									
21 Jul	23:00	26	243	27	25	25	28	21					246	233	248	246	240									
22 Jul	0:00	20	230	17	22	19	23	20					224	239	233	223	222									
22 Jul	1:00	23	243	27	21	21	25	27					251	239	240	240	238									
22 Jul	2:00	22	239	21	25	21	23	24					242	253	238	224	232									
22 Jul	3:00	12	235	12	12	15	11	13	11				224	269	233	230	221	121								
22 Jul	4:00	18	244	16	19	21	18	16	7				233	259	250	237	239	235								
22 Jul	5:00	11	216	8	12	12	12	12	11				217	225	237	209	192	257								
22 Jul	6:00	13	239	11	10	12	17	14	7				238	227	251	231	245	203								
22 Jul	7:00	18	234	18	19	22	17	16	7				236	239	235	227	235	106								
22 Jul	8:00	15	236	16	13	14	18	20					225	243	242	234	218									
22 Jul	9:00	17	240	19	16	10	21	26					241	244	242	234	215									
22 Jul	10:00	28	232	25	31	27	30	30					238	227	236	227	234									
22 Jul	11:00	24	238	25	22	25	24	25					246	239	235	232	226									
22 Jul	12:00	14	226	9	13	19	17	16	18				241	256	213	220	213	210								
22 Jul	13:00	6	245	3	4	6	5	15	19				271	207	270	241	241	214								
22 Jul	14:00	5	99	4	3	10	5	7	8	2			50	85	86	81	95	174	213							
22 Jul	15:00	2	73	9	3	2	3	5	1	3			84	38	254	210	62	310	179							
22 Jul	16:00	2	318	4	5	1	7	6	5	10			196	259	184	26	352	297	240							
22 Jul	17:00	3	124	4	8	4	4	4	4	17			31	188	143	145	182	236	232	232						
22 Jul	18:00	5	85	3	8	7	9	9	4	10			89	56	106	110	73	278	237							
22 Jul	19:00	5	173	5	7	8	6	3	9	3			89	95	98	111	160	201	54							
22 Jul	20:00	13	236	9	2	13	19	23	21				204	286	247	239	237	229								
22 Jul	21:00	26	231	26	26	24	28	32					230	228	234	231	229									
22 Jul	22:00	28	246	23	29	28	31	18					241	246	243	253	232									
22 Jul	23:00	29	241	25	33	30	30	23					237	239	246	244	257									
23 Jul	0:00	22	225	20	22	23	23						220	228	227	233										
23 Jul	1:00	28	233	27	25	34	34						236	239	227	234										
23 Jul	2:00	20	232	15																						

Date (2003)	Hour (PST)	Average Speed Direction		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]								
		(cm s <sup>-1</sup> )	(°T)	[-1.1]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1]	[-1.1]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1]	
23 Jul	4:00	8	205	8	7	3	13	11	1				195	196	164	194	243	181				
23 Jul	5:00	8	165	12	8	11	5	7	4				149	123	130	129	120	231				
23 Jul	6:00	14	231	18	13	17	11	12	6				231	233	217	251	230	256				
23 Jul	7:00	14	228	14	11	13	17	14	7				233	232	235	215	228	260				
23 Jul	8:00	19	232	21	18	19	20	19	10				229	240	229	224	238	270				
23 Jul	9:00	15	241	15	10	15	19	18	7				237	234	252	243	238	118				
23 Jul	10:00	26	243	25	25	28	26	26					252	239	237	245	237					
23 Jul	11:00	32	238	32	31	31	34	32					236	234	242	241	226					
23 Jul	12:00	20	248	16	22	21	23	24					249	250	251	244	233					
23 Jul	13:00	15	234	5	14	17	21	19	22				263	245	224	231	232	218				
23 Jul	14:00	2	115	2	5	4	4	9	10				344	295	246	167	129	183				
23 Jul	15:00	2	136	5	4	7	3	6	6	7			165	337	112	105	178	237	280			
23 Jul	16:00	4	160	2	5	7	9	3	4	6			111	180	119	130	74	188	181			
23 Jul	17:00	2	237	3	7	2	2	4	15	8			88	3	115	13	239	223	259			
23 Jul	18:00	8	227	5	5	4	8	12	18	15			196	217	206	240	244	223	214			
23 Jul	19:00	9	231	6	8	11	4	12	15	13			232	230	226	231	242	228	248			
23 Jul	20:00	14	221	10	12	15	16	17	15	7			232	205	226	208	228	225	101			
23 Jul	21:00	23	236	22	21	26	24	23	17				236	242	242	227	234	230				
23 Jul	22:00	20	237	24	22	18	19	22					237	227	249	237	233					
23 Jul	23:00	24	233	25	22	25	31						241	238	221	232						
24 Jul	0:00	24	228	25	21	27	22						234	227	223	232						
24 Jul	1:00	25	239	25	26	24	16						238	240	240	233						
24 Jul	2:00	19	234	21	20	18	16						244	233	223	224						
24 Jul	3:00	14	218	10	18	14	15						208	223	218	230						
24 Jul	4:00	11	116	11	12	8	15	12					170	197	171	180	210					
24 Jul	5:00	7	206	4	7	11	6	11	4				238	203	195	205	209	133				
24 Jul	6:00	7	206	5	10	4	8	10	14				226	204	193	214	196	223				
24 Jul	7:00	9	201	6	11	12	7	12	10				185	181	219	235	192	224				
24 Jul	8:00	12	225	12	8	13	14	11	8				224	218	223	222	239	188				
24 Jul	9:00	19	235	15	18	23	21	21	23				226	251	237	220	237	241				
24 Jul	10:00	27	243	27	24	27	29	30	10				238	241	240	246	248	233				
24 Jul	11:00	30	238	31	28	32	32	33					243	232	236	241	237					
24 Jul	12:00	23	233	20	18	22	33	27					237	238	237	226	233					
24 Jul	13:00	26	240	21	28	28	29	34					236	249	241	234	233					
24 Jul	14:00	21	232	19	19	21	26	27					235	234	237	224	225					
24 Jul	15:00	15	225	9	14	15	13	20	21	6	6		248	235	239	219	213	207				
24 Jul	16:00	13	235	10	9	10	15	15	20	16			230	256	248	246	223	222	224			
24 Jul	17:00	9	229	1	5	8	17	12	12	11	4		152	264	240	215	245	222	225	117		
24 Jul	18:00	5	242	5	8	5	4	9	5	5	9		284	248	296	196	217	243	216	228		
24 Jul	19:00	7	229	3	7	1	8	9	10	16	4		245	218	312	266	209	223	226	108		
24 Jul	20:00	6	224	2	1	4	10	14	10	14			307	177	216	233	210	229	213			
24 Jul	21:00	12	226	15	13	8	10	14	8				224	232	239	224	218	200				
24 Jul	22:00	23	237	19	27	22	26	25	8				246	241	221	233	244	212				
24 Jul	23:00	38	237	42	36	40	35	28					238	236	237	236	242	242				
25 Jul	0:00	46	240	46	45	47	44						239	242	239	241						
25 Jul	1:00	43	238	41	49	40	30						239	240	236	235						
25 Jul	2:00	37	239	39	35	37	22						241	239	235	232						
25 Jul	3:00	31	233	37	29	28	23						228	231	241	237						
25 Jul	4:00	20	225	18	23	21	26						217	225	233	224						
25 Jul	5:00	21	232	21	22	19	22	21					228	236	227	236	246	246	246			
25 Jul	6:00	16	230	14	9	24	19	17	7				219	243	230	224	239	252				
25 Jul	7:00	13	223	11	11	13	16	15	13				242	216	200	234	222	245				
25 Jul	8:00	13	223	15	17	11	8	18	9				199	203	235	252	241	193				
25 Jul	9:00	14	231	15	11	12	19	14	16				240	224	240	217	237	226				
25 Jul	10:00	15	231	11	12	13	22	20	15				259	234	210	245	213	218				
25 Jul	11:00	19	245	17	16	14	24	23	22				251	239	233	245	252	217				
25 Jul	12:00	17	244	19	18	12	21	26					240	255	238	242	238					
25 Jul	13:00	17	231	16	12	16	19	22	15				252	238	227	226	217	165				
25 Jul	14:00	6	199	3	4	8	9	13	8				105	129	228	191	220	215				
25 Jul	15:00	7	250	3	4	11	9	12	3				266	252	225	256	264	4				
25 Jul	16:00	5	244	8	4	7	7	6	7	11			323	261	239	211	245	205	219			
25 Jul	17:00	3	192	9	6	5	6	1	4	12			75	95	103	190	40	283	220			
25 Jul	18:00	2	160	1	6	1	1	2	2	11			328	121	146	143	198	101	193	184		
25 Jul	19:00	3	145	1	5	4	4	1	5	9	6		75	163	62	133	164	112	221	205		
25 Jul	20:00	2	125	7	4	4	3	5	6	9	6		120	89	176	157	21	248	224	102		
25 Jul	21:00	7	228	2	6	4	10	10	14	8			196	277	172	228	227	226	210			
25 Jul	22:00	22	233	22	26	21	24	19	17				239	234	236	224	232	230				
25 Jul	23:00	29	236	29	33	23	31	26					244	238	234	228	244					
26 Jul	0:00	37	241	37	39	36	41						237	243	244	239						

Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]										
		cm s <sup>-1</sup>	°T	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]			
26 Jul	1:00	30	242	30	29	34	27						247	252	230	235								
26 Jul	2:00	32	238	29	35	27							244	232	255									
26 Jul	3:00	27	241	29	26	27							240	243	240									
26 Jul	4:00	16	229	18	14	17	15						231	233	224	223								
26 Jul	5:00	12	234	14	12	9	16	8					239	215	243	239	143							
26 Jul	6:00	4	193	6	3	10	4	5					177	68	193	278	103							
26 Jul	7:00	8	86	14	13	7	1	7	6				78	85	94	18	102	206						
26 Jul	8:00	3	60	5	6	7	3	1	2				42	113	53	13	242	106						
26 Jul	9:00	2	211	0	5	3	4	10	4				103	311	304	214	167	200						
26 Jul	10:00	16	223	6	11	22	18	24	16				205	224	235	216	222	224						
26 Jul	11:00	22	239	24	19	24	23	22					240	238	237	241	239							
26 Jul	12:00	27	243	22	26	31	27	24					247	237	247	242	242							
26 Jul	13:00	17	231	13	19	16	21	21					235	230	235	227	230							
26 Jul	14:00	21	229	21	22	20	19	18					226	227	235	228	225							
26 Jul	15:00	22	230	16	17	27	23	29	23				247	226	230	231	224	209						
26 Jul	16:00	12	236	12	16	13	14	13	8	12			245	227	235	250	240	211	183					
26 Jul	17:00	12	240	15	14	12	9	10	14	11			258	240	223	239	208	257	215					
26 Jul	18:00	11	228	8	13	14	11	12	16	9	7		221	210	245	229	242	243	189	221				
26 Jul	19:00	8	218	7	9	9	9	9	10	6	9		186	207	230	230	209	227	230	218				
26 Jul	20:00	13	229	15	12	10	12	10	18	13	7		209	246	232	243	210	236	225	244				
26 Jul	21:00	13	244	11	10	12	16	15	18	11	8		256	247	256	252	237	241	218	96				
26 Jul	22:00	15	224	16	13	15	18	14	15	13			236	203	229	218	227	228	121					
26 Jul	23:00	14	242	16	14	10	14	16	5				261	243	243	236	225	139						
27 Jul	0:00	26	235	21	29	29	25	17					237	233	234	236	215							
27 Jul	1:00	37	238	35	38	37	32						233	241	241	232								
27 Jul	2:00	30	241	31	30	34							247	236	244									
27 Jul	3:00	19	237	19	19	22							244	230	228									
27 Jul	4:00	9	230	9	10	13							246	216	206									
27 Jul	5:00	8	232	9	5	11	11						220	268	225	261								
27 Jul	6:00	2	145	0	1	4	4	11					310	38	138	179	292							
27 Jul	7:00	6	222	7	12	7	2	7	10				234	255	205	172	183	190						
27 Jul	8:00	9	94	12	12	7	9	3	4				86	104	89	85	126	59						
27 Jul	9:00	6	187	11	3	10	6	4	8	9			75	100	87	122	169	156	76					
27 Jul	10:00	8	209	6	3	8	13	10	12				199	195	195	214	226	203						
27 Jul	11:00	10	213	10	11	13	9	10					211	215	219	203	211							
27 Jul	12:00	19	220	20	14	20	21	15					228	205	218	226	205							
27 Jul	13:00	25	237	22	27	26	31						234	243	233	233								
27 Jul	14:00	20	235	20	20	21	26						231	230	243	244								
27 Jul	15:00	17	228	14	16	22	18	17					250	220	221	224	226							
27 Jul	16:00	17	224	13	15	17	22	22	15				238	244	216	213	220	228						
27 Jul	17:00	7	234	7	9	5	3	8	9	10			231	241	224	251	236	227	246					
27 Jul	18:00	8	222	1	12	10	11	10	8	12	3		243	253	206	215	211	193	238	139				
27 Jul	19:00	4	228	1	9	8	0	2	7	9	7		265	243	232	179	35	251	185	214				
27 Jul	20:00	5	128	6	3	9	9	4	6	6	6		205	301	145	143	141	190	184	105				
27 Jul	21:00	3	221	8	2	0	1	4	10	12	6		107	350	359	72	244	248	220	248				
27 Jul	22:00	2	240	4	4	4	4	14	7	16			94	83	46	242	253	236	211					
27 Jul	23:00	21	238	18	17	17	23	28	21				250	224	244	237	237	226						
28 Jul	0:00	31	238	30	30	31	35	35					250	234	232	236	240							
28 Jul	1:00	37	240	34	41	38	42						233	247	238	235								
28 Jul	2:00	37	242	34	39	34							241	243	239									
28 Jul	3:00	29	240	30	29	25							236	244	244									
28 Jul	4:00	21	237	20	23	20							231	243	237									
28 Jul	5:00	17	240	13	22	16	9						235	245	238	242								
28 Jul	6:00	12	219	15	10	10	13						223	203	229	214								
28 Jul	7:00	11	236	11	11	7	17	4					242	227	251	233	213							
28 Jul	8:00	8	227	8	9	10	10	6	7				230	233	216	234	221	214						
28 Jul	9:00	12	228	7	13	12	8	16	19	7			250	214	241	237	215	230	114					
28 Jul	10:00	22	232	19	24	25	24	21	21				230	237	233	230	230	228						
28 Jul	11:00	16	245	19	16	16	15	17	19				237	240	238	265	249	237						
28 Jul	12:00	20	233	20	16	20	28	25					238	249	225	226	217							
28 Jul	13:00	25	235	21	25	25	28	26					244	228	238	230	221							
28 Jul	14:00	16	235	13	14	17	20	14					231	250	235	229	217							
28 Jul	15:00	14	236	13	11	16	16	20					242	246	229	232	232							
28 Jul	16:00	5	158	1	8	8	10	1	10				63	164	161	109	13	98						
28 Jul	17:00	2	313	5	2	3	6	3	2				234	232	346	24	310	200						
28 Jul	18:00	4	90	3	5	4	7	8	6	4			65	92	218	86	110	50	239					
28 Jul	19:00	6	189	10	6	7	8	8	4	2	8		109	86	144	88	104	126	307	280				
28 Jul	20:00	2	268	5	2	2	6	4	2	5	8		350	302	286	254	257	225	305	224	135			
28 Jul	21:00	2	250	0																				

Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]									
		Direction (°T)	Speed (cm s <sup>-1</sup> )	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]		
28 Jul	22:00	2	204	5	1	0	6	7	7	10	13		282	140	175	28	174	146	241	230			
28 Jul	23:00	10	250	10	11	7	7	9	15	14			232	252	251	270	259	245	245				
29 Jul	0:00	23	231	22	21	24	24	22	16				234	230	229	230	233	226					
29 Jul	1:00	43	240	42	42	45	43	21					243	242	237	239	223						
29 Jul	2:00	41	243	42	39	42	38						239	242	247	237							
29 Jul	3:00	39	240	38	40	38							237	244	244								
29 Jul	4:00	38	239	38	33								239	243									
29 Jul	5:00	26	239	27	26	21							251	227	238								
29 Jul	6:00	12	215	13	9	15							219	199	221								
29 Jul	7:00	12	236	8	16	12	13	11					235	230	246	234	242						
29 Jul	8:00	11	227	15	10	7	12	10	8				236	225	213	227	225	145					
29 Jul	9:00	7	218	2	6	7	9	13	11	9			250	156	256	246	205	210	105				
29 Jul	10:00	8	197	9	8	8	6	10	12	3			211	224	218	163	193	173	155				
29 Jul	11:00	10	223	13	13	7	7	13	12				230	222	227	223	216	216					
29 Jul	12:00	15	239	11	14	19	16	17	15				262	238	238	218	244	241					
29 Jul	13:00	28	236	27	29	29	26	27					239	232	242	231	241						
29 Jul	14:00	18	244	15	17	24	34						267	243	230	234							
29 Jul	15:00	21	243	19	19	24	27						256	230	243	228							
29 Jul	16:00	12	238	4	12	19	17	19					289	252	236	218	217						
29 Jul	17:00	5	222	2	3	3	8	9	5				179	187	257	236	217	199					
29 Jul	18:00	2	141	2	1	5	3	5	9	2			164	250	303	148	125	146	179				
29 Jul	19:00	4	163	12	10	3	5	2	11	6	6		80	106	138	103	211	185	217	223			
29 Jul	20:00	4	184	7	4	6	7	7	9	5	1		171	269	141	90	70	105	94	175			
29 Jul	21:00	3	256	3	5	2	2	10	3	7	13	8	99	327	183	23	259	75	263	238	244		
29 Jul	22:00	1	218	5	6	3	5	6	5	5	12		56	209	286	194	87	263	254	250			
29 Jul	23:00	5	238	7	6	6	3	4	11	10	12		318	276	193	222	201	216	243	97			
30 Jul	0:00	19	237	17	17	21	23	19	16				243	242	239	227	238	223					
30 Jul	1:00	31	239	29	33	31	31	34					235	240	240	238	228						
30 Jul	2:00	38	240	41	33	40	36						239	238	241	234							
30 Jul	3:00	47	243	48	47	43							245	241	243								
30 Jul	4:00	39	244	36	42	32							244	244	239								
30 Jul	5:00	29	241	28	30								247	235									
30 Jul	6:00	23	238	27	20	20							236	240	223								
30 Jul	7:00	6	210	7	5	6	11						216	191	219	227							
30 Jul	8:00	6	155	9	8	3	9	4	19				170	131	132	141	114	91					
30 Jul	9:00	9	218	3	9	14	12	10	19				162	223	213	213	243	236					
30 Jul	10:00	19	237	18	23	21	16	20	15	13			240	234	237	249	232	233	237				
30 Jul	11:00	21	239	22	21	20	21	21	19				225	236	242	237	256	228					
30 Jul	12:00	12	232	15	9	11	15	11	16				230	221	229	238	236	227					
30 Jul	13:00	25	240	21	26	25	29	36					250	246	237	230	235						
30 Jul	14:00	33	233	29	29	40	36						237	234	229	232							
30 Jul	15:00	31	239	28	31	34	31						244	235	239	248							
30 Jul	16:00	21	238	17	19	23	25	23					242	223	238	245	250						
30 Jul	17:00	7	181	6	11	5	10	8					122	82	112	153	194						
30 Jul	18:00	6	182	5	5	8	6	5	11				119	101	115	108	129	196					
30 Jul	19:00	3	92	5	4	5	4	5	4	9			61	237	79	92	111	97	156				
30 Jul	20:00	3	171	5	1	8	4	2	2	5	3		126	351	86	131	207	179	145	46			
30 Jul	21:00	5	73	11	6	6	7	3	5	5	5		58	103	105	72	91	52	309	230			
30 Jul	22:00	3	190	4	5	9	7	9	3	5	8	10	91	45	72	73	109	189	206	219	103		
30 Jul	23:00	2	205	2	1	8	3	1	8	3	3		45	75	171	253	328	228	218	248			
31 Jul	0:00	12	234	5	9	12	17	15	14	19	10		241	246	239	226	235	230	234				
31 Jul	1:00	18	232	19	18	17	18	18	19				229	242	232	232	227	243					
31 Jul	2:00	28	238	28	28	31	25	23					232	243	236	239	232						
31 Jul	3:00	37	238	33	38	41	33						232	244	237	241							
31 Jul	4:00	39	244	35	42	44							248	241	245								
31 Jul	5:00	54	240	54	55	48							242	238	242								
31 Jul	6:00	41	236	42	41	41							234	239	237								
31 Jul	7:00	17	225	17	17	17	20						228	230	218	232							
31 Jul	8:00	16	219	16	19	14	16						227	220	207	234							
31 Jul	9:00	12	233	12	14	13	14	6	8				232	229	226	243	238	235					
31 Jul	10:00	19	224	20	18	23	15	17	21	9			222	232	229	214	225	219	235				
31 Jul	11:00	12	235	9	4	9	16	18	17	14			265	245	256	219	233	225	242				
31 Jul	12:00	14	236	12	12	14	13	16	21	12			247	254	237	244	220	225	244				
31 Jul	13:00	23	238	23	22	24	23	23	27				240	237	244	230	238	225					
31 Jul	14:00	28	239	25	28	30	29	33					227	247	234	246	239						
31 Jul	15:00	29	236	27	27	30	33	32					238	236	237	234	229						
31 Jul	16:00	31	239	29	30	32	35	30					241	243	237	235	243						
31 Jul	17:00	21	232	20	22	23	20	20					233	239	225	231	225						
31 Jul	18:00	15	219	13	14	15	17	16					222	211	234	212</							

Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> )										Current Direction (°T)										
		Direction (°T)	Speed (cm s <sup>-1</sup> )	[Depth Bin (m MLLW)]					[Depth Bin (m MLLW)]					[Depth Bin (m MLLW)]					[Depth Bin (m MLLW)]					
		[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]					
31 Jul	19:00	16	220	19	15	20	12	17	19		220	226	233	199	216	224								
31 Jul	20:00	10	221	10	11	12	10	9	9	4	216	231	220	219	204	231	219							
31 Jul	21:00	11	225	12	10	15	11	12	16	6	5	231	228	226	244	209	216	225	257					
31 Jul	22:00	17	234	21	14	16	17	15	22	20	10	239	238	233	218	227	223	260	255					
31 Jul	23:00	12	240	13	15	9	16	10	12	12	16	234	235	255	240	255	233	235	247					
1 Aug	0:00	11	232	15	12	11	11	10	8	15	10	234	248	214	218	240	230	235	121					
1 Aug	1:00	18	239	17	18	18	21	19	15	14		245	231	230	248	237	242	111						
1 Aug	2:00	25	242	21	28	27	25	24	3		239	235	242	240	253	105								
1 Aug	3:00	40	237	35	41	43	42	15			240	234	236	239	212									
1 Aug	4:00	48	241	48	49	49	52				239	243	242	243										
1 Aug	5:00	53	242	50	56	55					248	237	242											
1 Aug	6:00	41	236	40	42	46					236	237	231											
1 Aug	7:00	22	231	21	22	24	22				234	233	226	231										
1 Aug	8:00	22	228	19	23	20	27	5			225	228	224	234	142									
1 Aug	9:00	14	224	14	12	10	19	15	13		220	231	225	215	233	151								
1 Aug	10:00	15	209	10	11	14	21	20	13		223	212	206	207	205	207								
1 Aug	11:00	13	228	11	17	11	13	14	13	16	241	231	234	232	227	205	209							
1 Aug	12:00	8	222	9	7	8	11	9	7	8	227	220	214	226	236	206	266							
1 Aug	13:00	14	240	9	12	15	17	18	23		247	251	253	237	221	236								
1 Aug	14:00	17	237	18	18	16	17	16			223	237	254	235	240									
1 Aug	15:00	17	236	20	16	12	19	21			247	231	229	234	235									
1 Aug	16:00	14	233	13	13	15	15	28			244	246	217	228	222									
1 Aug	17:00	26	231	21	23	31	29	28			237	229	227	234	202									
1 Aug	18:00	18	222	15	16	22	19	8			239	222	209	225	156									
1 Aug	19:00	4	112	4	4	7	7	6			238	257	148	158	119									
1 Aug	20:00	1	133	6	1	8	3	9	6		192	193	260	87	85	110								
1 Aug	21:00	2	225	11	6	2	3	1	5	5	238	237	110	142	323	56	88							
1 Aug	22:00	6	234	11	8	8	10	3	2	4	10	240	220	246	234	273	254	173	90					
1 Aug	23:00	6	205	3	8	6	4	6	7	11	8	147	192	165	200	253	212	219	255					
2 Aug	0:00	8	246	4	2	6	10	11	17	17	5	29	91	259	264	235	235	244	274					
2 Aug	1:00	9	228	9	7	5	9	17	18	18		277	252	161	226	213	226	216						
2 Aug	2:00	15	228	13	15	16	16	15	12		238	216	238	231	219	229								
2 Aug	3:00	27	237	27	22	30	27	22			236	231	238	242	232									
2 Aug	4:00	26	241	24	25	28	25	23			245	239	243	238	236									
2 Aug	5:00	34	240	29	32	41	33				244	240	238	252										
2 Aug	6:00	33	235	32	31	37	24				233	230	241	250										
2 Aug	7:00	17	240	15	14	22	11				241	253	231	252										
2 Aug	8:00	7	210	7	10	8	1				262	201	182	254										
2 Aug	9:00	4	223	5	4	4	5	3			228	215	235	218	39									
2 Aug	10:00	12	248	14	9	9	15	10			265	240	233	248	208									
2 Aug	11:00	19	225	21	18	18	22	17	19		219	227	229	231	215	231	231							
2 Aug	12:00	12	240	12	12	13	9	14	11	21	236	242	241	229	247	240	221	221	222					
2 Aug	13:00	15	239	18	13	12	20	14	14	19	236	246	255	241	223	237	222							
2 Aug	14:00	14	249	11	10	17	12	19	20		228	245	263	254	246	231	231							
2 Aug	15:00	20	236	13	19	25	20	22	17	17	242	236	241	232	232	216	216							
2 Aug	16:00	24	230	26	28	25	19	21			238	218	232	233	235									
2 Aug	17:00	29	235	30	30	32	27	23			243	235	242	220	225									
2 Aug	18:00	18	228	21	16	17	19	11			224	236	229	224	159									
2 Aug	19:00	20	246	21	16	19	23	7			245	243	248	248	214									
2 Aug	20:00	16	233	16	14	17	17	11			224	226	244	236	220									
2 Aug	21:00	6	208	5	6	10	6	5	5		241	236	212	156	187	224								
2 Aug	22:00	9	230	7	12	10	10	5	12	1	242	237	212	221	247	232	66							
2 Aug	23:00	9	234	8	11	7	3	13	11	11	252	226	253	215	218	240	279							
3 Aug	0:00	5	198	5	3	4	8	6	10	8	253	205	208	151	184	208	232							
3 Aug	1:00	2	239	2	4	5	3	2	6	7	280	212	283	97	193	248	313							
3 Aug	2:00	11	225	2	3	13	15	15	17	8	228	249	226	219	210	239	240							
3 Aug	3:00	14	226	10	15	16	16	16	15		225	223	215	241	226	238	238							
3 Aug	4:00	19	235	21	19	20	18	16			234	238	229	238	241									
3 Aug	5:00	26	239	22	26	28	27	24			243	239	246	229	232									
3 Aug	6:00	24	240	20	24	31	23				245	230	245	240										
3 Aug	7:00	21	236	19	21	22	18				239	235	234	261										
3 Aug	8:00	16	243	14	15	20	23				237	246	244	243										
3 Aug	9:00	6	226	7	9	4	7	5			206	259	190	222	286									
3 Aug	10:00	7	217	9	9	6	5	2			212	216	235	208	250									
3 Aug	11:00	10	221	9	10	6	12	14	9		201	243	193	230	222	223								
3 Aug	12:00	6	216	4	6																			

Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]									
		Direction (°T)	Speed (cm s <sup>-1</sup> )	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]		
3 Aug	16:00	20	232	15	16	19	24	27	23				228	248	230	235	223	240					
3 Aug	17:00	18	236	13	13	24	22	33					255	238	227	232	241						
3 Aug	18:00	20	232	8	25	28	28						254	227	231	239							
3 Aug	19:00	23	238	18	23	28	24	18					251	239	239	224	224						
3 Aug	20:00	22	230	17	27	19	25	15					233	227	237	228	235						
3 Aug	21:00	13	221	14	16	10	16	10					250	206	213	218	211						
3 Aug	22:00	9	231	5	15	13	6	8	14				223	237	221	263	221	119					
3 Aug	23:00	10	224	7	6	13	13	13	15				238	242	243	210	205	240					
4 Aug	0:00	6	242	3	5	7	8	10	11				212	236	200	278	255	239					
4 Aug	1:00	7	195	5	11	12	7	6	10				155	133	177	220	219	235	116				
4 Aug	2:00	8	238	3	4	11	8	14	14	33			341	291	258	240	227	208	271				
4 Aug	3:00	10	231	9	6	12	11	12	13				228	238	227	225	239	238					
4 Aug	4:00	10	232	4	6	11	17	14	13				252	214	232	232	235	215					
4 Aug	5:00	11	243	11	10	11	15	16					246	261	229	240	241						
4 Aug	6:00	14	230	18	12	14	12	13					229	226	229	235	283						
4 Aug	7:00	18	228	17	19	19	17						235	230	220	234							
4 Aug	8:00	18	238	18	20	18	17						235	233	246	225							
4 Aug	9:00	20	234	22	19	19	19						238	233	232	238							
4 Aug	10:00	8	226	7	10	11	5	10					226	232	218	235	219						
4 Aug	11:00	12	228	3	13	15	16	13	15				259	218	214	235	239	230					
4 Aug	12:00	8	230	8	7	5	10	9	13	9			197	248	270	240	226	223	229				
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4 Aug	16:00	7	237	8	2	5	9	10	20	20			157	172	274	265	261	234	205				
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4 Aug	18:00	14	235	8	9	11	21	20	9				246	249	232	230	231	217					
4 Aug	19:00	24	231	23	28	22	26						218	238	238	237							
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4 Aug	21:00	21	242	18	18	26	25						247	239	241	237							
4 Aug	22:00	18	242	19	18	20	18	6					244	239	248	236	150						
4 Aug	23:00	11	221	11	14	11	12	6					217	246	189	224	189						
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5 Aug	2:00	2	47	3	2	3	6	4	4				44	84	242	60	19	218					
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5 Aug	4:00	2	199	2	5	1	5	5	16				33	137	234	219	230	252					
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5 Aug	22:00	28	237	23	29	32	31						239	231	241	232							
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6 Aug	4:00	14	230	14	15	17	13	9	9				230	228	233	236	221	227					
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6 Aug	6:00	13	221	13	13	12	17	10					217	214	240	208	233						
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6 Aug	9:00	30	240	32	27	29	33	33					239	242	237	241	243						
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6 Aug	11:00	19	231	17	21	20	17	14					229	233	233	227	213						
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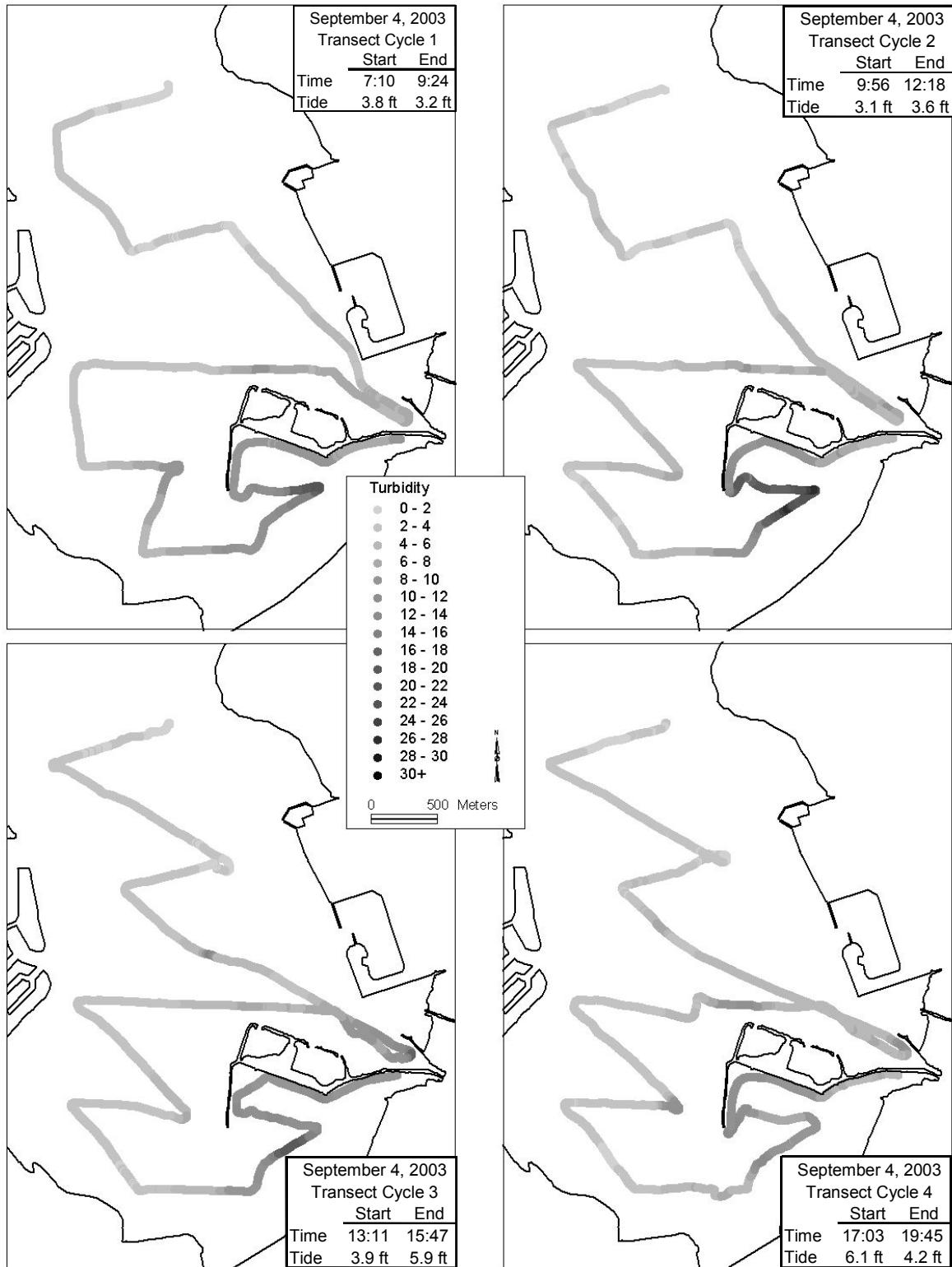
Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]												
		Direction (°T)	Speed (cm s <sup>-1</sup> )	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]	[ -1.1 ]	[ -0.7 ]	[ -0.3 ]	[ 0.1 ]	[ 0.5 ]	[ 0.9 ]	[ 1.3 ]	[ 1.7 ]	[ 2.1 ]					
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6 Aug	14:00	8	212	5	4	8	8	12	12	13			169	200	254	216	205	212	231							
6 Aug	15:00	4	226	4	1	4	6	9	8	14			264	13	169	222	231	230	215							
6 Aug	16:00	7	225	8	3	2	6	7	9	20	12		193	244	261	269	225	232	216	223						
6 Aug	17:00	4	227	4	5	1	2	6	11	14	13		314	116	8	176	245	227	227	247						
6 Aug	18:00	3	110	4	7	5	1	12	12	12			74	100	119	126	229	227	201							
6 Aug	19:00	19	228	17	16	25	20	22	18	2			226	212	215	237	246	230	308							
6 Aug	20:00	29	239	28	29	27	28	31	15				243	236	240	236	242	226								
6 Aug	21:00	37	241	37	34	36	41	38					249	242	239	233	244									
6 Aug	22:00	36	240	34	37	38	39						241	239	240	237										
6 Aug	23:00	35	239	34	36	34	23						238	239	240	234										
7 Aug	0:00	39	234	34	43	40	20						236	231	237	212										
7 Aug	1:00	30	236	28	30	32	32						238	239	231	235										
7 Aug	2:00	21	222	20	27	17	17						206	228	232	251										
7 Aug	3:00	10	228	12	11	7	10	12					223	233	223	231	262									
7 Aug	4:00	14	226	15	20	11	13	13	25				232	213	259	218	221	273								
7 Aug	5:00	15	218	16	11	21	16	12	9				217	217	210	216	236	209								
7 Aug	6:00	16	236	14	18	19	16	15	18				242	228	243	224	244	252								
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7 Aug	8:00	12	234	7	11	18	13	12	9				253	231	230	236	230	249								
7 Aug	9:00	24	230	19	25	28	24	26	8				240	224	228	233	228	202								
7 Aug	10:00	26	239	23	26	27	28	27					241	249	236	231	232									
7 Aug	11:00	11	228	11	10	12	14	14					255	227	215	221	196									
7 Aug	12:00	19	226	20	17	22	18	21					224	238	224	220	225									
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7 Aug	14:00	7	135	5	9	8	9	6	9	6			213	158	148	118	180	184	236							
7 Aug	15:00	8	237	10	7	9	11	8	7				272	252	223	213	231	217								
7 Aug	16:00	6	238	4	4	9	9	6	10	11	3		110	189	242	217	289	253	248	266						
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7 Aug	21:00	29	239	24	30	28	28	33	20				236	245	239	237	237	247								
7 Aug	22:00	41	243	41	40	42	40	27					253	241	244	234	224									
7 Aug	23:00	53	241	50	55	53	44						242	240	243	243										
8 Aug	0:00	50	241	49	52	52							241	240	238											
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8 Aug	2:00	38	243	37	39	32							243	242	238											
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8 Aug	7:00	3	204	6	2	5	6	10	9	17			25	40	93	198	217	228	118							
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8 Aug	9:00	4	54	8	9	8	1	6	10				72	41	40	304	210	230								
8 Aug	10:00	21	237	14	20	19	23	30	17				230	246	244	236	233	232								
8 Aug	11:00	37	239	35	40	34	39	34					236	238	244	237	251									
8 Aug	12:00	27	245	24	29	28	38						244	240	250	239										
8 Aug	13:00	26	238	28	27	25	24						245	239	228	228										
8 Aug	14:00	9	235	14	8	7	11	11					256	219	191	248	215									
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8 Aug	18:00	8	192	12	10	13	12	7	7	7	7		6	89	74	100	83	88	133	154	192	176				
8 Aug	19:00	3	102	1	4	5	8	6	7	9	4		283	51	85	89	114	102	241	237						
8 Aug	20:00	6	209	4	3	2	9	6	12	14	4		132	292	262	168	183	232	220	279						
8 Aug	21:00	4	228	2	4	6	3	10	16	19			37	301	23	192	204	225	236							
8 Aug	22:00	26	234	23	28	27	27	28	11				231	236	233	236	234	212								
8 Aug	23:00	42	240	41	40	42	44						236	239	245	242										
9 Aug	0:00	51	243	49	49	55							242	241	245											
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9 Aug	4:00	24	235	23	25	24	24						236	242	228	230										
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9 Aug	6:00	7	223																							

Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]									
		cm s <sup>-1</sup>	(°T)	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]		
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9 Aug	13:00	18	229	17	23	15	13						236	235	211	219							
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9 Aug	16:00	5	209	5	4	12	5	10	4				284	272	221	133	172	184					
9 Aug	17:00	4	89	7	9	9	5	1	3	8	2		46	67	103	53	157	75	182	223			
9 Aug	18:00	1	130	2	4	9	5	2	4	8	8	3	288	18	19	98	179	156	190	222	62		
9 Aug	19:00	3	100	5	7	4	5	8	6	2	5	6	155	50	75	14	101	146	56	184	229		
9 Aug	20:00	3	158	8	5	4	10	8	4	4	5	7	123	60	169	184	100	345	160	277	86		
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9 Aug	22:00	17	231	16	9	15	24	18	19	13			240	228	233	228	225	235	234				
9 Aug	23:00	31	239	28	29	33	33	32	16				240	234	240	241	238	247					
10 Aug	0:00	46	241	42	46	50	43						241	241	241	246							
10 Aug	1:00	51	242	45	56	54							241	243	239								
10 Aug	2:00	55	242	53	58	55							246	238	239								
10 Aug	3:00	46	244	47	45	47							244	244	244								
10 Aug	4:00	33	240	33	33	35							240	240	243								
10 Aug	5:00	22	230	22	19	24	16						225	232	233	243							
10 Aug	6:00	6	218	5	6	9	9	12					278	203	192	227	215						
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10 Aug	8:00	3	192	7	9	9	2	7	8	4			73	85	51	133	169	223	292				
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10 Aug	12:00	22	243	23	20	23	24						249	236	244	257							
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10 Aug	14:00	19	222	20	19	21	21						240	211	214	208							
10 Aug	15:00	9	236	8	4	12	15	17					265	248	223	229	203						
10 Aug	16:00	3	133	3	7	4	3	3					193	166	180	53	105						
10 Aug	17:00	1	208	5	3	2	2	2	2	5			278	215	221	159	103	115	168				
10 Aug	18:00	5	88	10	9	3	4	4	4	7	2		78	74	81	77	68	78	179	168			
10 Aug	19:00	5	183	5	8	6	3	3	10	6	5	8	124	109	119	77	140	108	90	150	278		
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11 Aug	10:00	9	241	6	9	8	13	16	11	13			325	250	213	227	248	230	211				
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11 Aug	12:00	24	234	26	22	22	26	30					237	236	233	230	247						
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11 Aug	14:00	33	238	30	36	35	32						250	235	231	240							
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12 Aug	4:00	44	246	45	43	41							247	245	251								
12 Aug	5:00	34	244	35	33	32							249	238	226								
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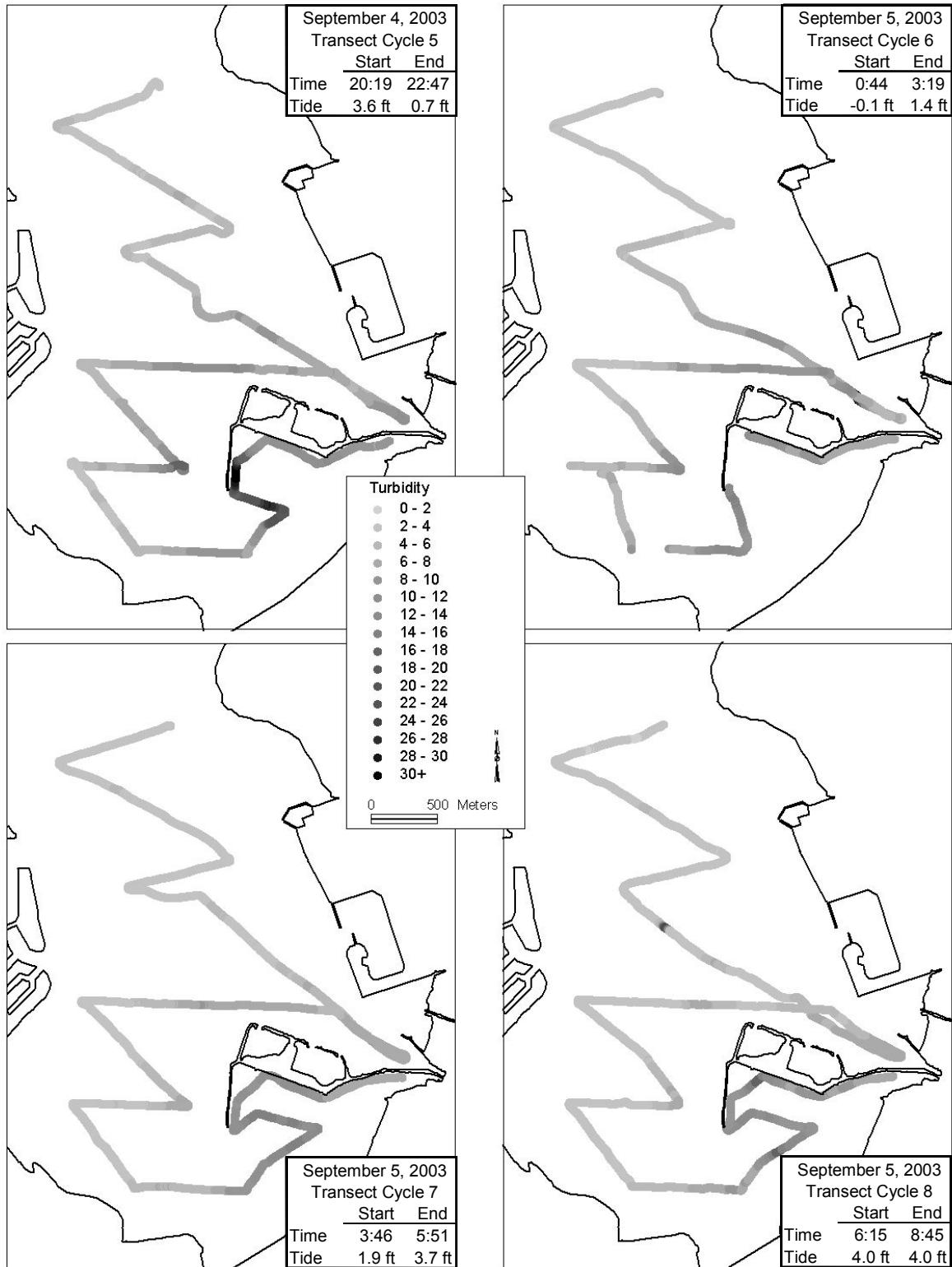
Date (2003)	Hour (PST)	Average Speed		Current Speed (cm s <sup>-1</sup> ) [Depth Bin (m MLLW)]										Current Direction (°T) [Depth Bin (m MLLW)]										
		cm s <sup>-1</sup>	(°T)	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]	[ -1.1 ]	-0.7	-0.3	0.1	0.5	0.9	1.3	1.7	2.1 ]			
12 Aug	7:00	18	229	15	20	19	17	21					229	223	234	230	233							
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12 Aug	9:00	5	124	3	9	4	8	3	7	8			67	146	193	173	222	200	210					
12 Aug	10:00	12	230	6	6	14	16	16	18	17			274	235	234	231	229	212	237					
12 Aug	11:00	14	230	18	16	11	12	15	11	16			223	241	227	222	234	235	239					
12 Aug	12:00	16	238	7	12	17	23	24	19				236	250	254	232	228	235						
12 Aug	13:00	35	242	38	36	30	35	31					235	239	248	246	235							
12 Aug	14:00	37	241	37	33	40	41						243	244	236	239								
12 Aug	15:00	29	242	25	29	33	36						245	243	238	237								
12 Aug	16:00	30	235	28	32	31	39						252	226	229	225								
12 Aug	17:00	15	235	2	17	16	24	30					219	243	234	232	217							
12 Aug	18:00	5	232	4	11	9	8	3					11	198	234	251	101							
12 Aug	19:00	7	102	8	9	13	5	4	3	1			111	109	74	115	133	95	278					
12 Aug	20:00	12	90	10	12	11	13	17	13	10	3		87	68	72	74	87	123	118	50				
12 Aug	21:00	3	82	3	5	9	7	5	3	1	3	9	88	97	75	55	104	75	193	261	237			
12 Aug	22:00	1	106	1	4	2	4	2	5	3	14	11	103	166	80	158	7	33	160	236	226			
12 Aug	23:00	4	254	9	3	3	5	3	2	8	7		282	198	263	252	270	243	234	285				
13 Aug	0:00	17	233	14	14	18	15	20	20	3			224	242	230	225	232	242	150					
13 Aug	1:00	29	243	23	32	31	30	26					237	246	244	242	239							
13 Aug	2:00	48	241	47	49	49	46						243	239	241	241								
13 Aug	3:00	55	237	51	60	54							238	236	242									
13 Aug	4:00	50	243	52	48	44							245	240	237									
13 Aug	5:00	42	240	41	43	38							239	240	253									
13 Aug	6:00	20	230	22	24	17	16						224	246	215	228								
13 Aug	7:00	7	241	2	5	13	8	9					261	191	253	247	221							
13 Aug	8:00	4	141	11	2	1	5	4	5				137	138	103	179	201	195						
13 Aug	9:00	3	116	6	2	9	4	11	10	13			99	32	113	164	228	237	246					
13 Aug	10:00	10	235	9	10	6	10	11	16	16			270	232	225	261	218	219	217					
13 Aug	11:00	13	235	14	11	12	7	17	20	18			214	216	251	263	240	237	231					
13 Aug	12:00	22	232	17	26	25	22	22	26				218	231	238	239	229	230						
13 Aug	13:00	29	230	27	29	30	31	28					236	226	232	228	241							
13 Aug	14:00	28	234	27	29	29	32						240	232	230	226								
13 Aug	15:00	35	240	34	34	38	41						243	240	238	231								
13 Aug	16:00	32	235	26	34	35	34						232	235	239	236								
13 Aug	17:00	24	231	18	25	25	28	21					239	235	227	225	222							
13 Aug	18:00	4	206	3	4	5	5	6	4				278	233	169	160	219	227						
13 Aug	19:00	3	89	1	5	2	7	3	10	13			283	12	135	124	119	80	102					
13 Aug	20:00	1	190	4	3	5	7	3	5	7	4		110	325	22	31	195	163	172	93				
13 Aug	21:00	4	91	3	5	6	6	5	6	4	10		47	81	55	70	89	140	149	223				
13 Aug	22:00	6	98	8	8	6	4	9	6	8	3	3	99	94	105	80	125	103	83	65	293			
13 Aug	23:00	5	94	7	13	5	5	8	4	4	7		27	75	91	142	114	100	192	261				
14 Aug	0:00	2	158	4	6	3	6	5	2	10			159	66	215	144	164	1	270					
14 Aug	1:00	15	226	9	13	16	19	21	27	19			250	229	230	215	221	241						
14 Aug	2:00	22	245	23	20	21	27	19					235	260	254	235	229							
14 Aug	3:00	37	238	35	37	38	34						233	236	245	247								
14 Aug	4:00	37	246	34	40	40							238	252	244									
14 Aug	5:00	43	241	42	44	45							244	239	231									
14 Aug	6:00	31	236	33	30	31	29						233	228	248	226								
14 Aug	7:00	22	237	22	21	22	25	6					240	245	243	222	248							
14 Aug	8:00	16	219	11	14	22	17	15					220	211	220	225	219							
14 Aug	9:00	3	159	7	7	3	4	4	8	5			80	95	138	103	216	236	201					
14 Aug	10:00	6	247	4	3	8	7	5	10	7			294	297	255	223	258	222	283					
14 Aug	11:00	7	194	9	10	3	5	10	10	5			188	161	238	193	218	193	206					
14 Aug	12:00	17	246	7	13	16	19	20	27	19			252	248	258	246	244	238	228					

# **Appendix H**

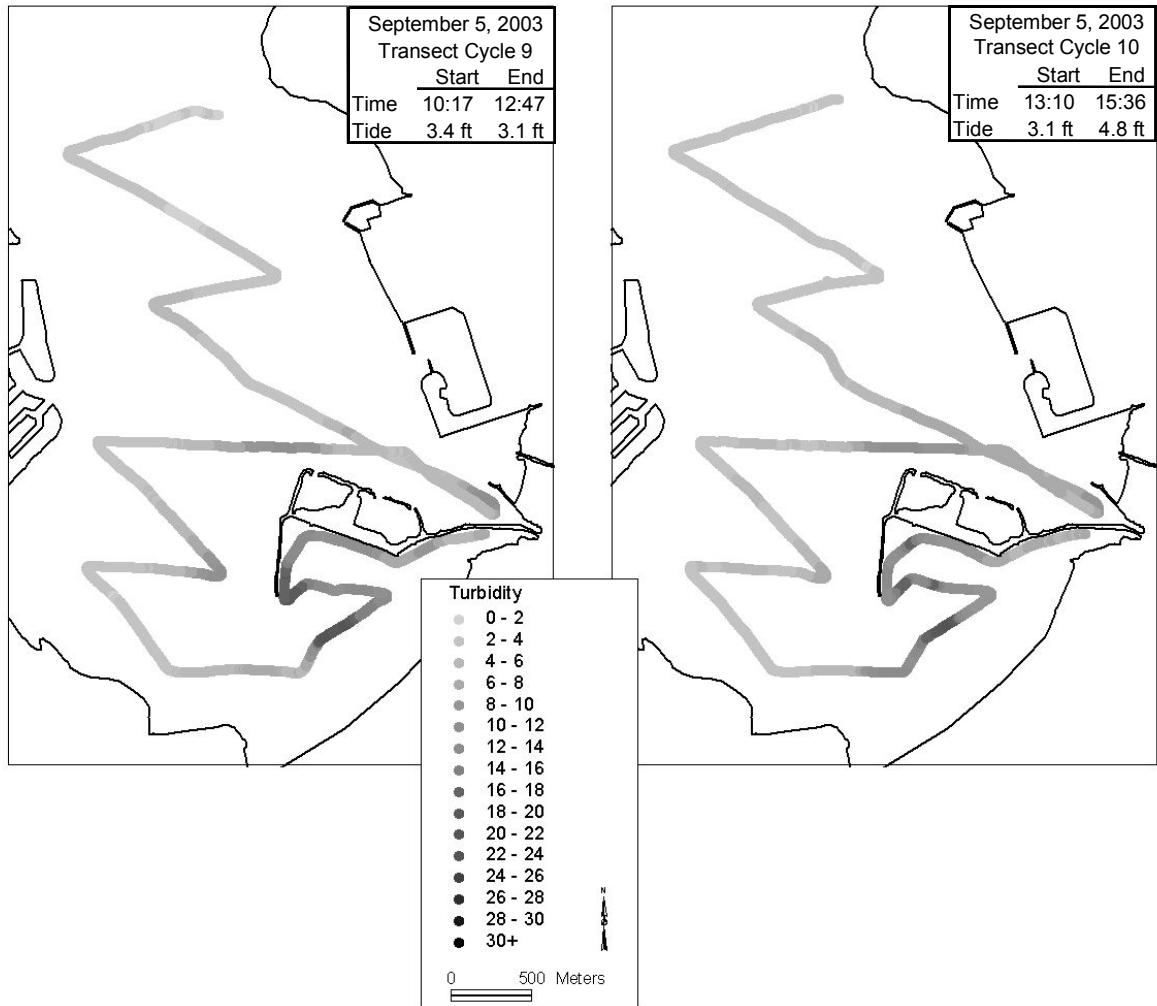
## **Turbidity and Wind Monitoring Data**



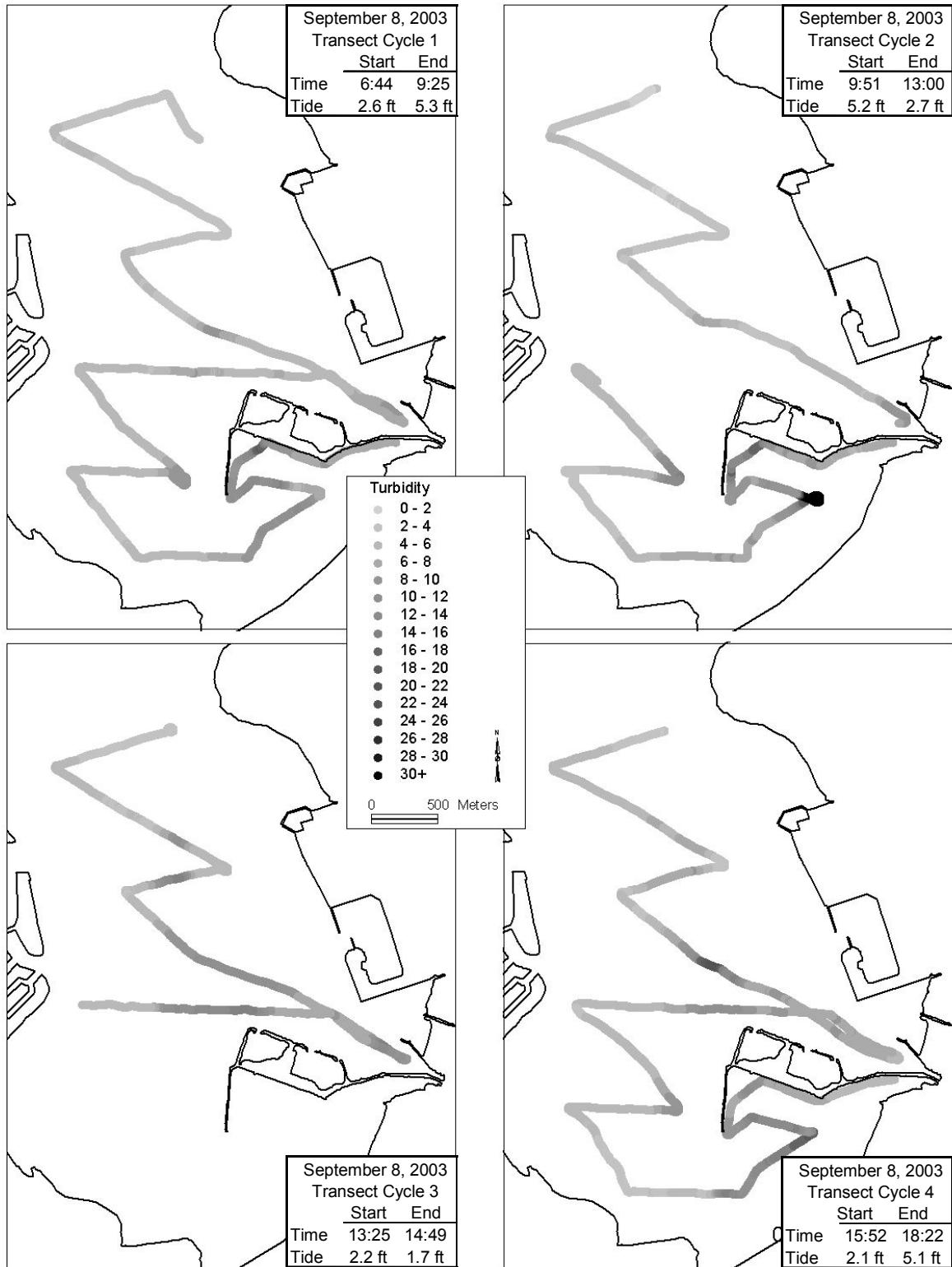
**Figure H1.** Results of towed turbidity data collection. Transect cycles 1 through 4, September 4, 2003. Times are Pacific Daylight Time.



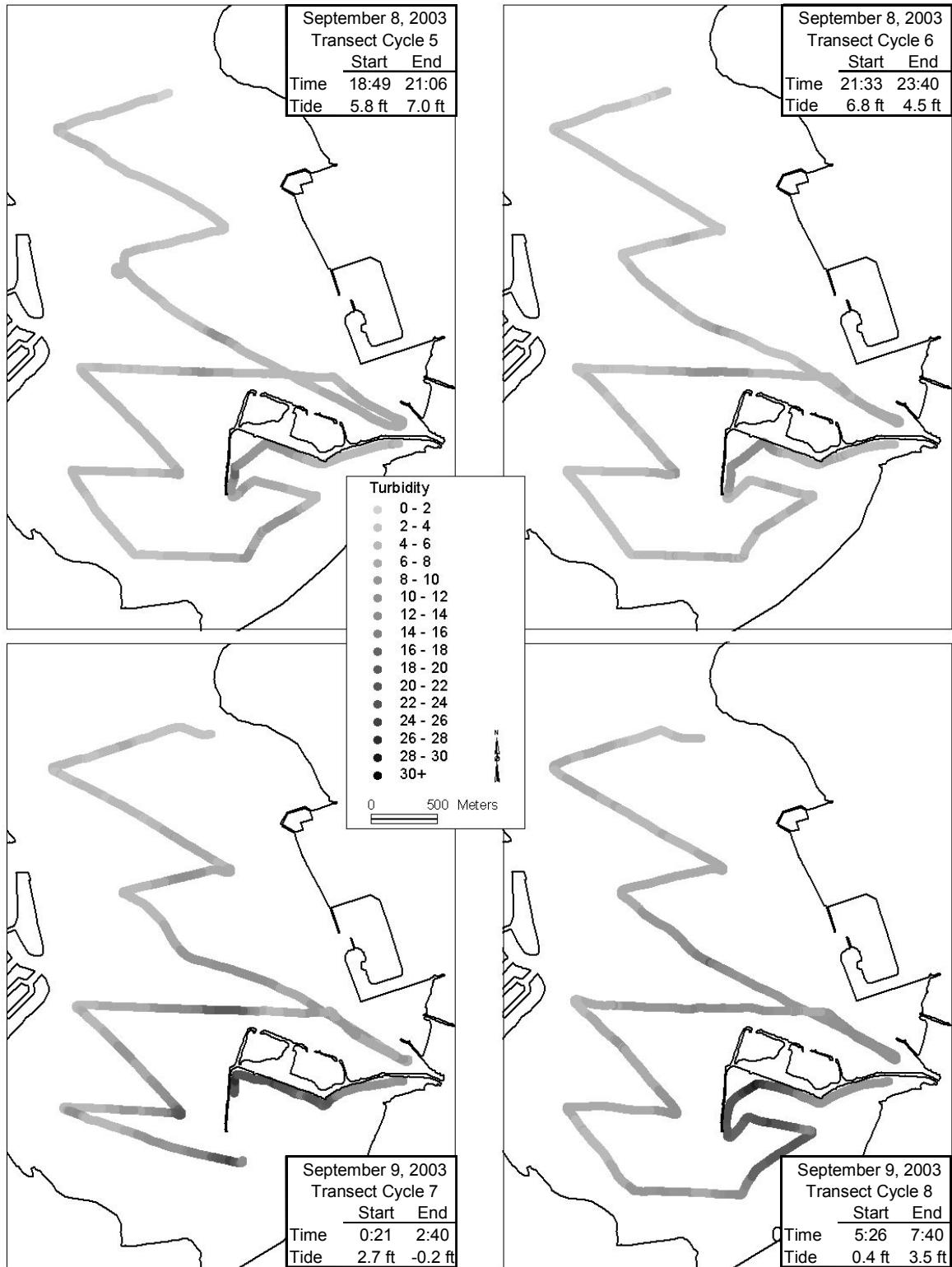
**Figure H2.** Results of towed turbidity data collection. Transect cycles 4 through 8, September 4&5, 2003. Times are Pacific Daylight Time.



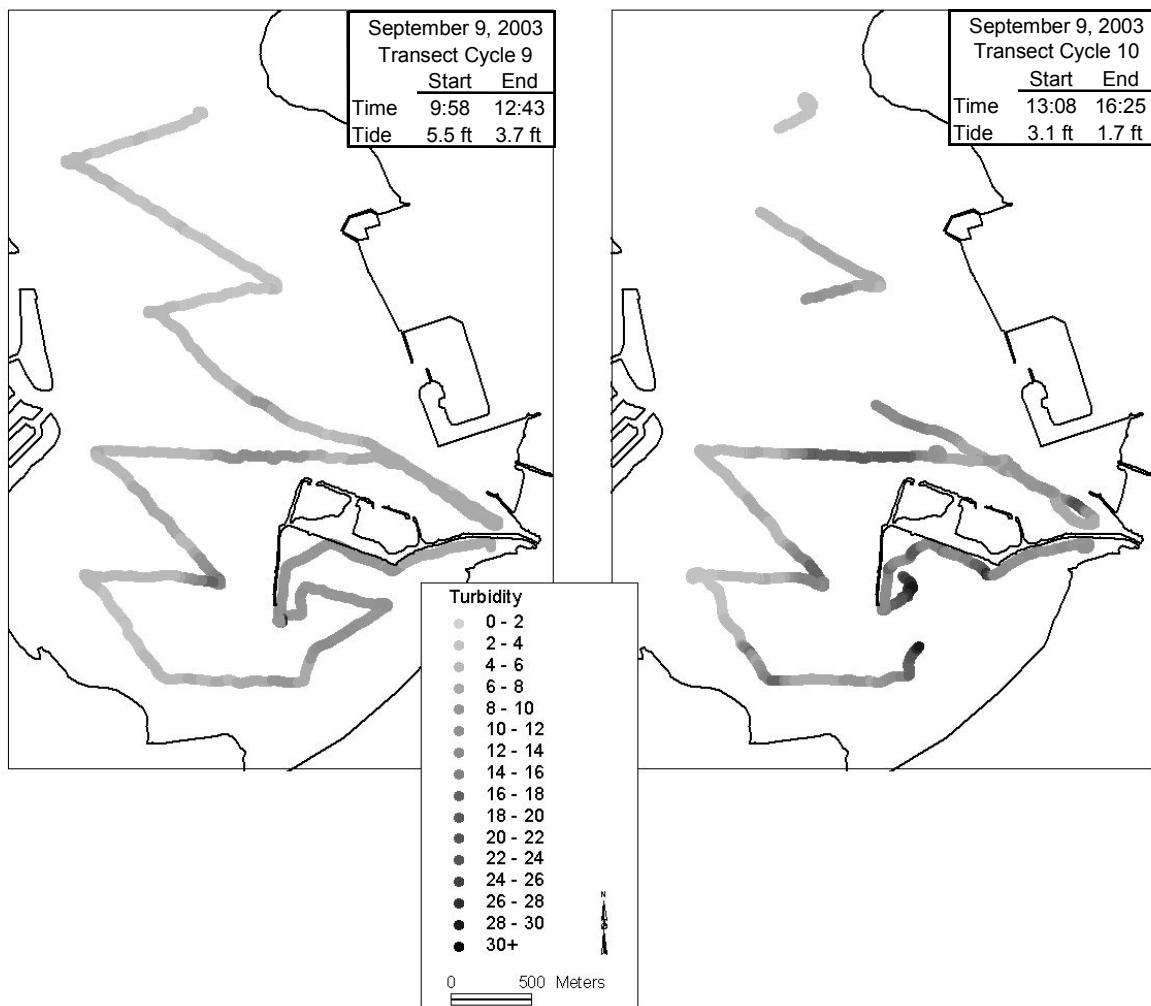
**Figure H3.** Results of towed turbidity data collection. Transect cycles 9 and 10, September 5, 2003. Times are Pacific Daylight Time.



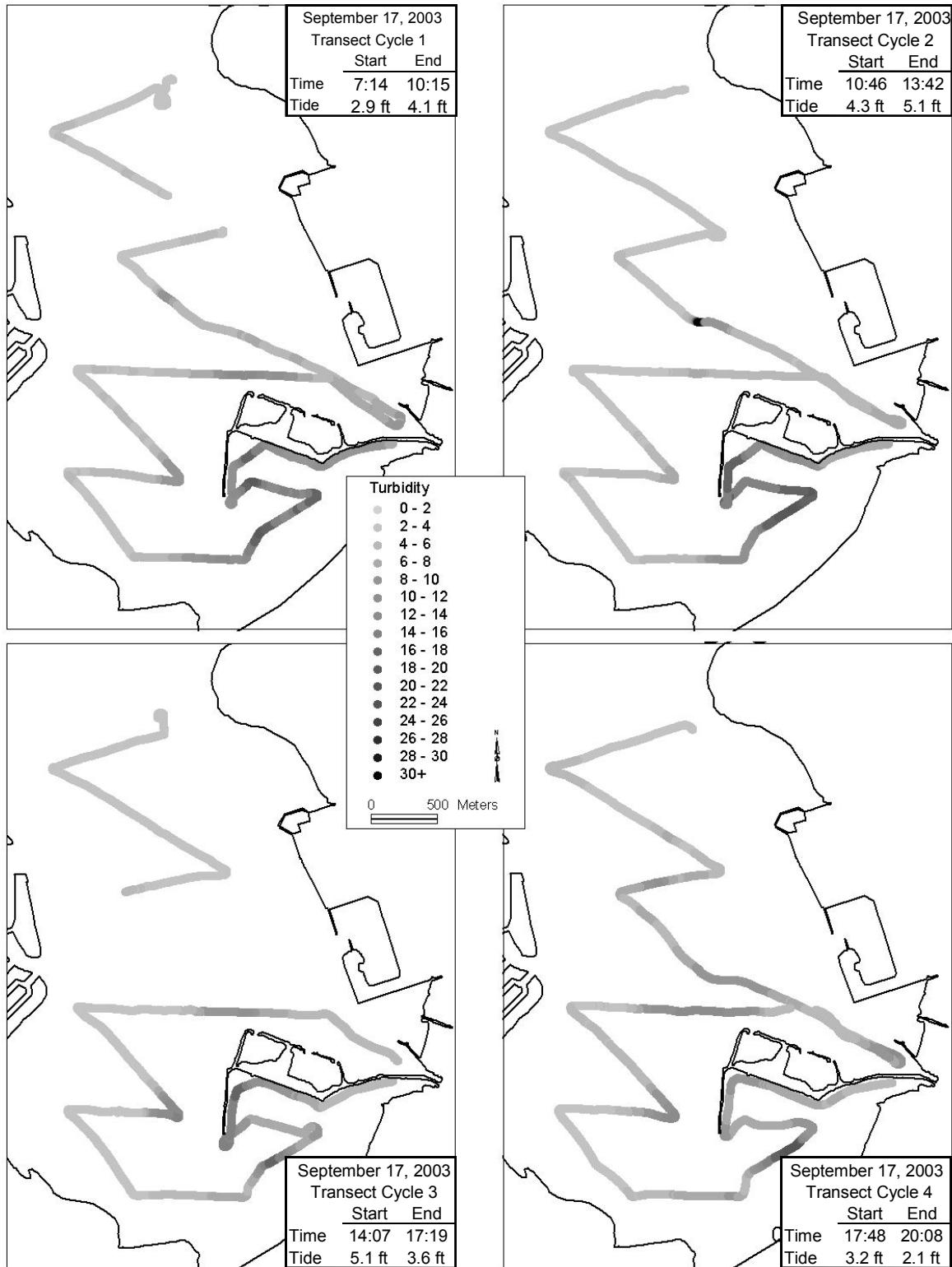
**Figure H4.** Results of towed turbidity data collection. Transect cycles 1 through 4, September 8, 2003. Times are Pacific Daylight Time.



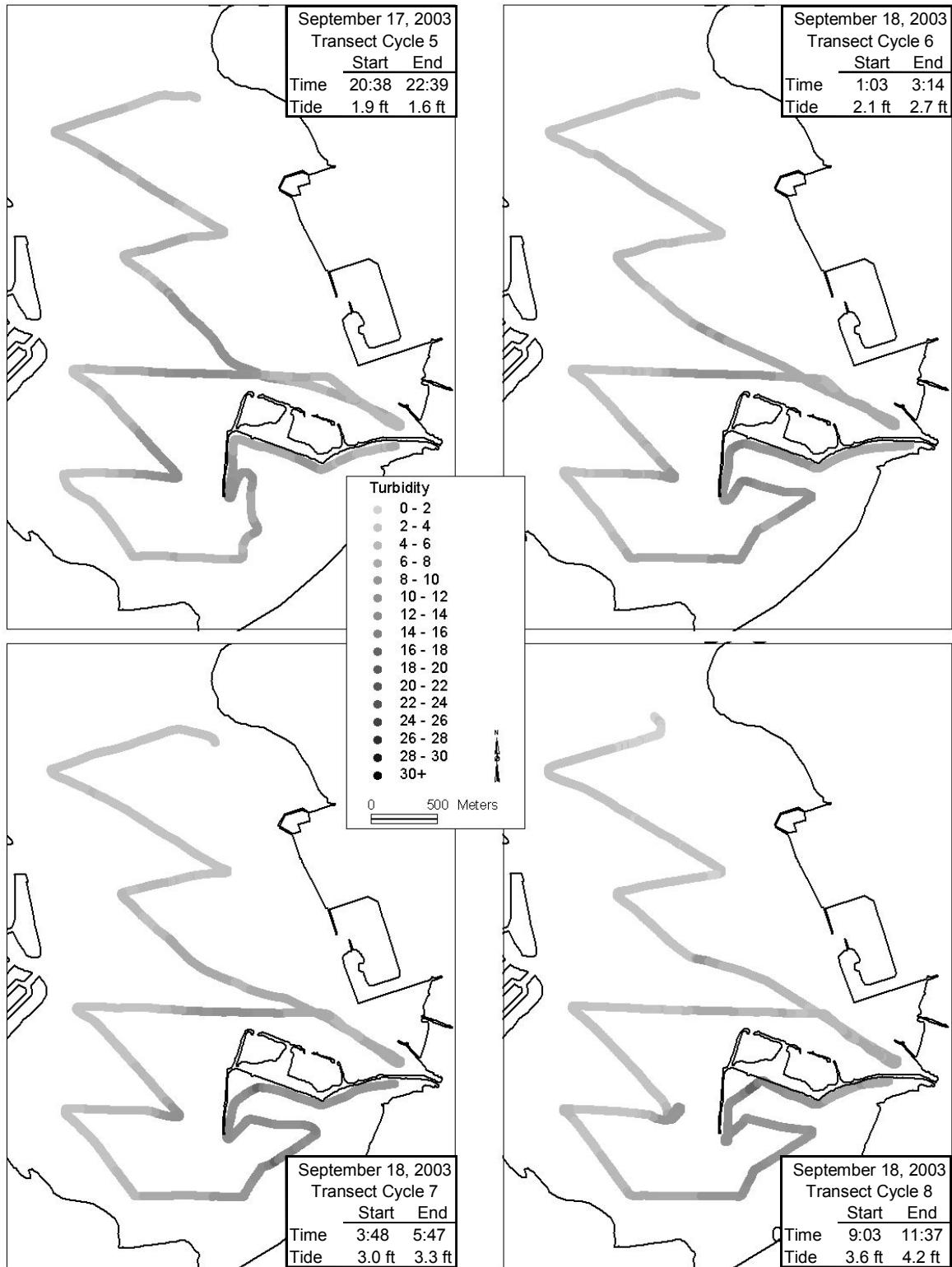
**Figure H5.** Results of towed turbidity data collection. Transect cycles 5 through 8, September 8&9, 2003. Times are Pacific Daylight Time.



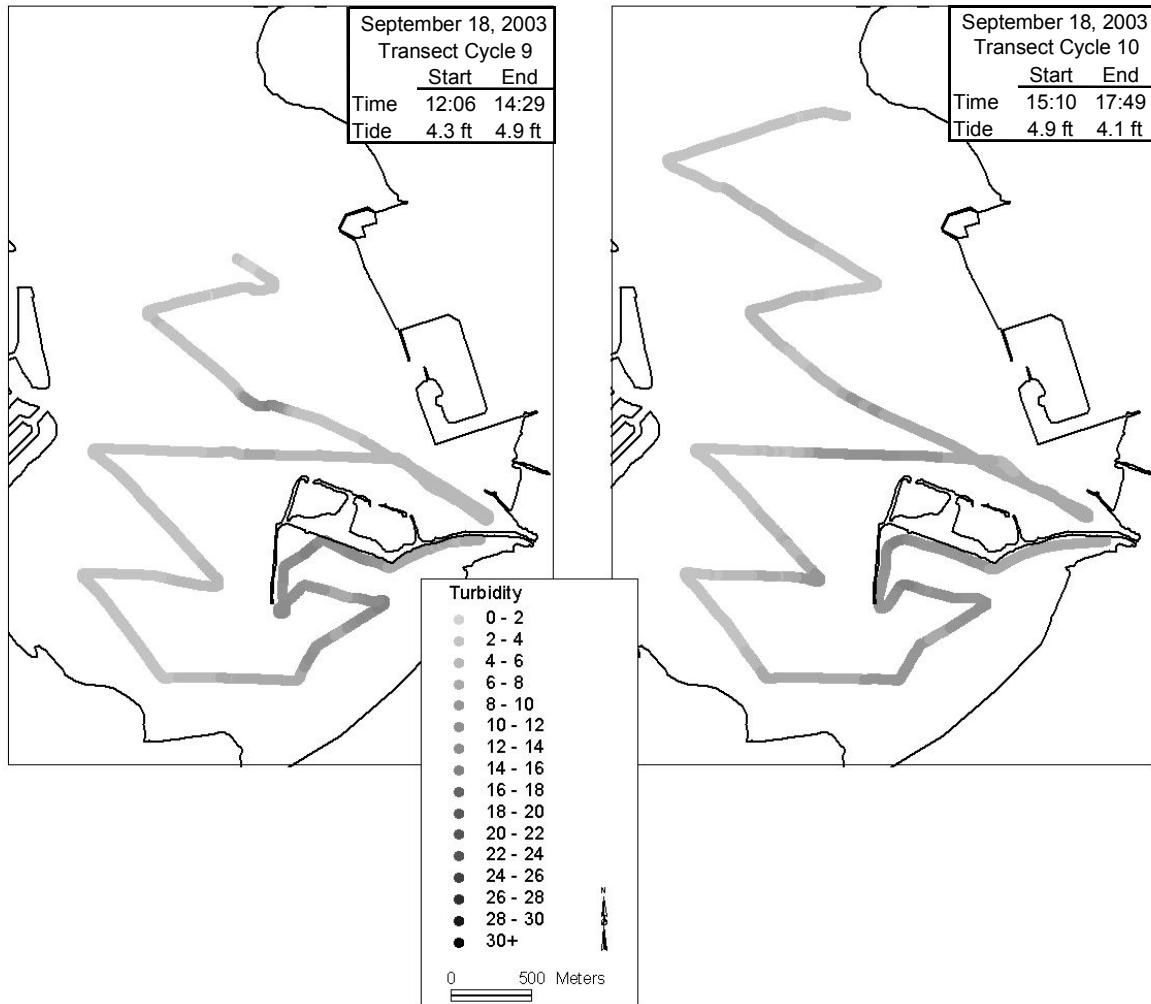
**Figure H6.** Results of towed turbidity data collection. Transect cycles 9 and 10, September 9, 2003. Times are Pacific Daylight Time.



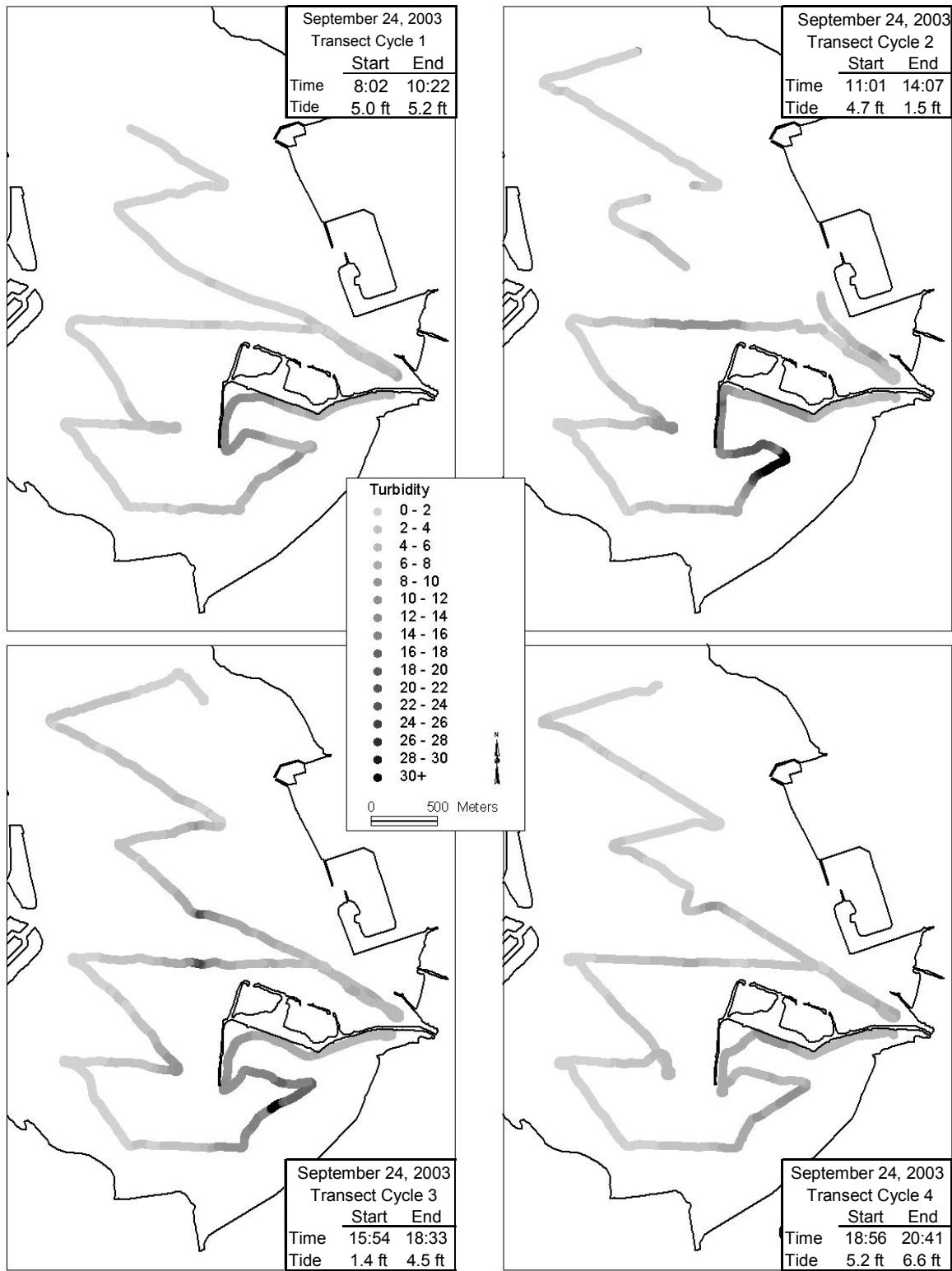
**Figure H7.** Results of towed turbidity data collection. Transect cycles 1 through 4, September 17, 2003. Times are Pacific Daylight Time.



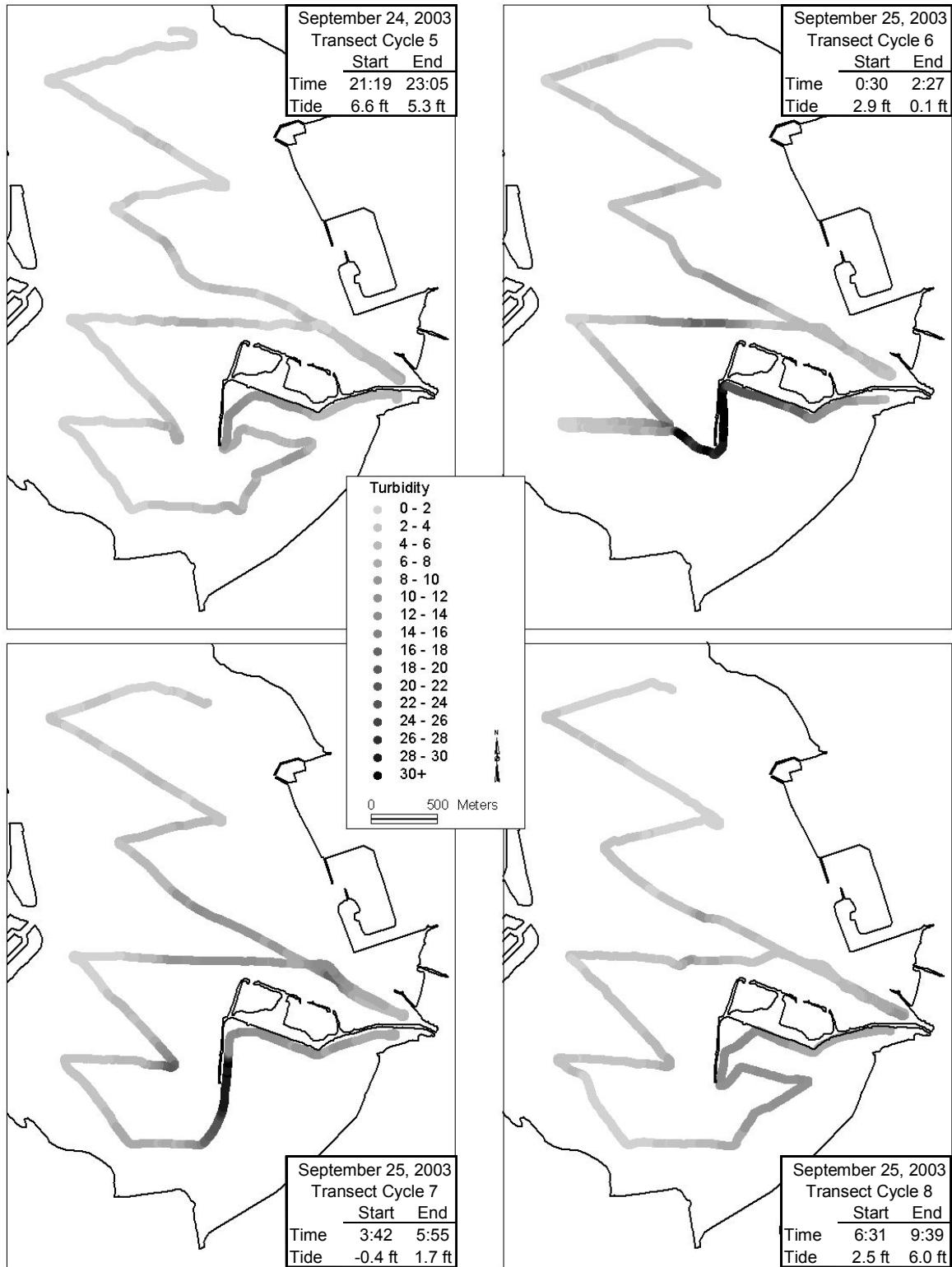
**Figure H8.** Results of towed turbidity data collection. Transect cycles 5 through 8, September 17&18, 2003. Times are Pacific Daylight Time.



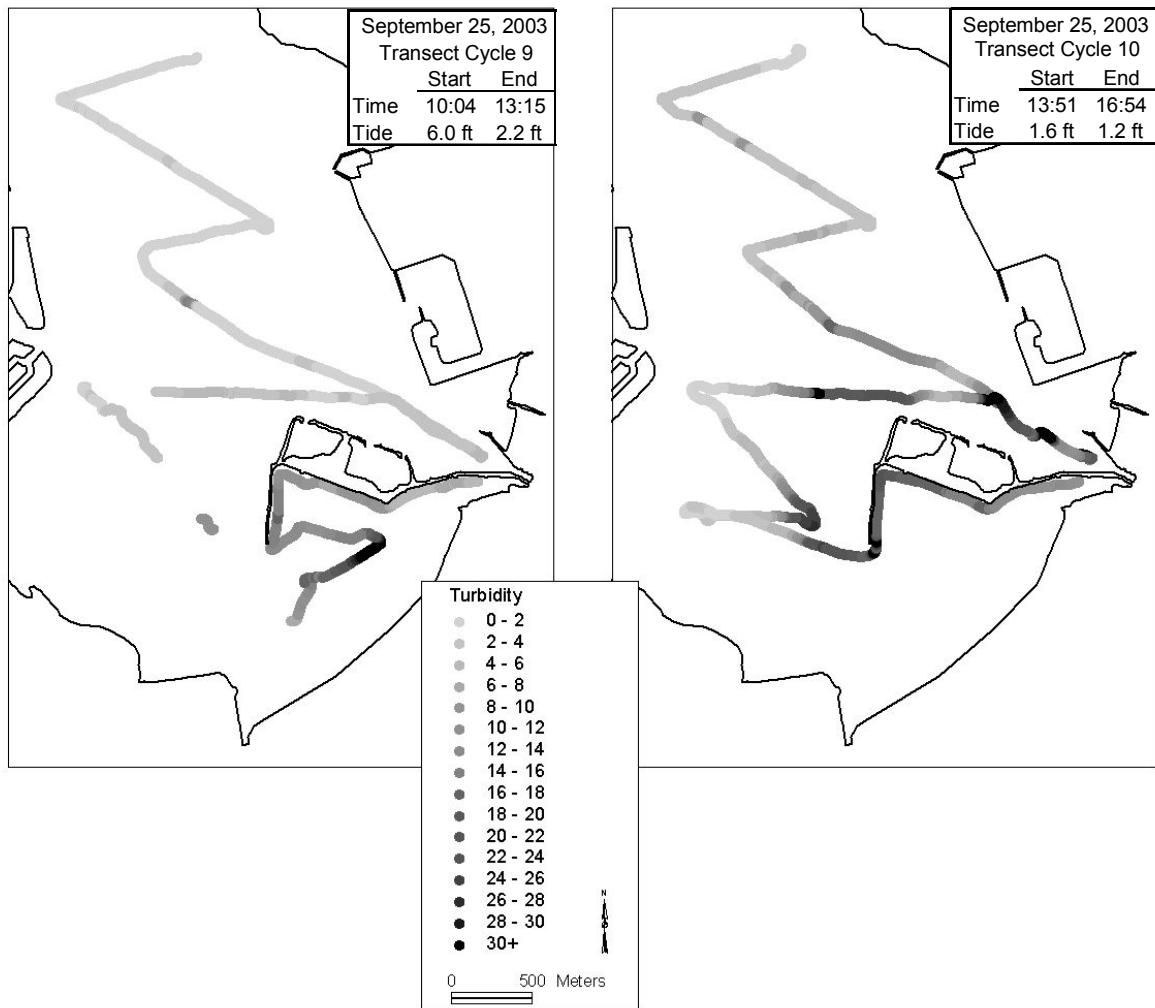
**Figure H9. Results of towed turbidity data collection. Transect cycles 9 and 10, September 18, 2003.**  
Times are Pacific Daylight Time.



**Figure H10.** Results of towed turbidity data collection. Transect cycles 1 through 4, September 24, 2003. Times are Pacific Daylight Time.

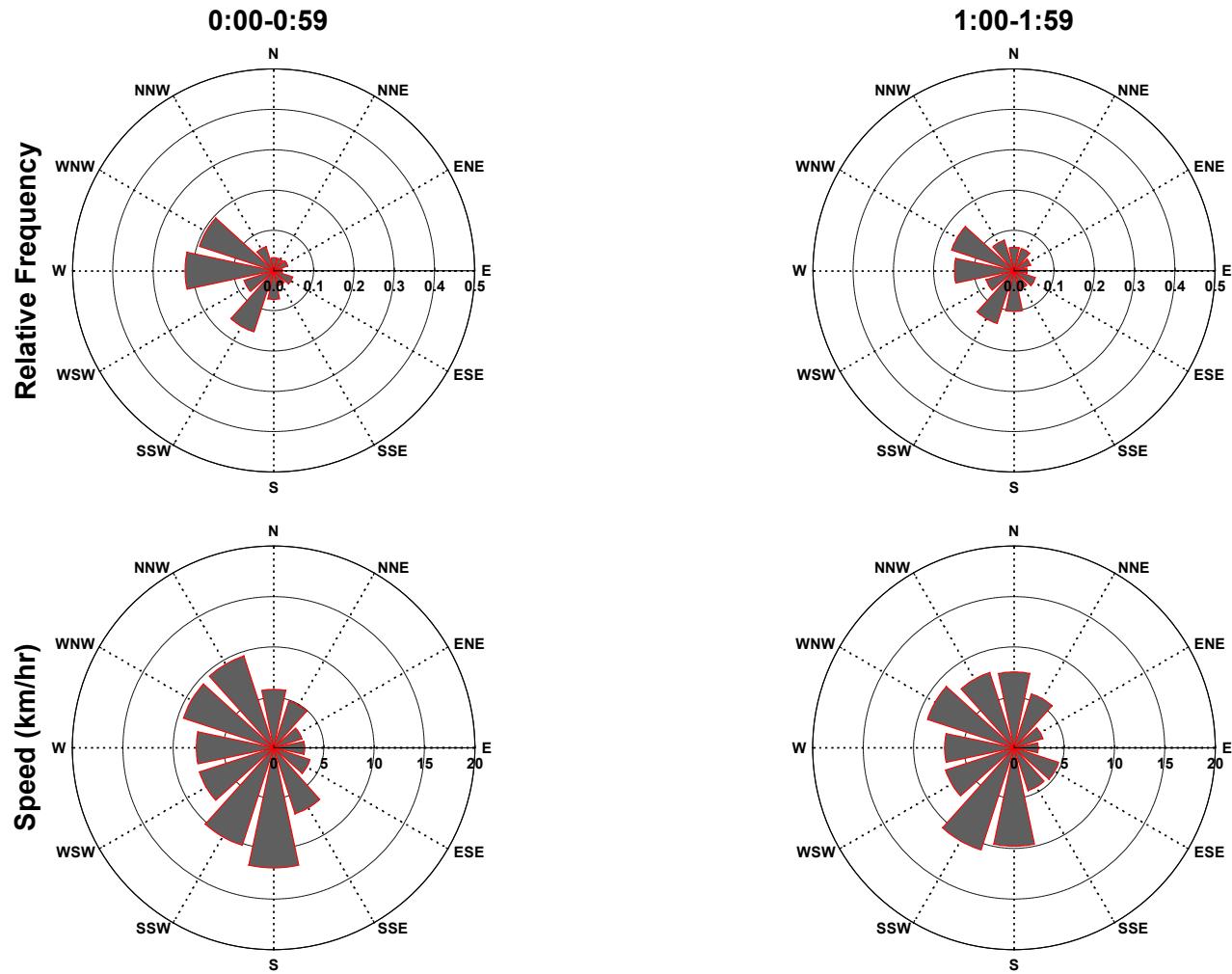


**Figure H11.** Results of towed turbidity data collection. Transect cycles 5 through 8, September 24&25, 2003. Times are Pacific Daylight Time.



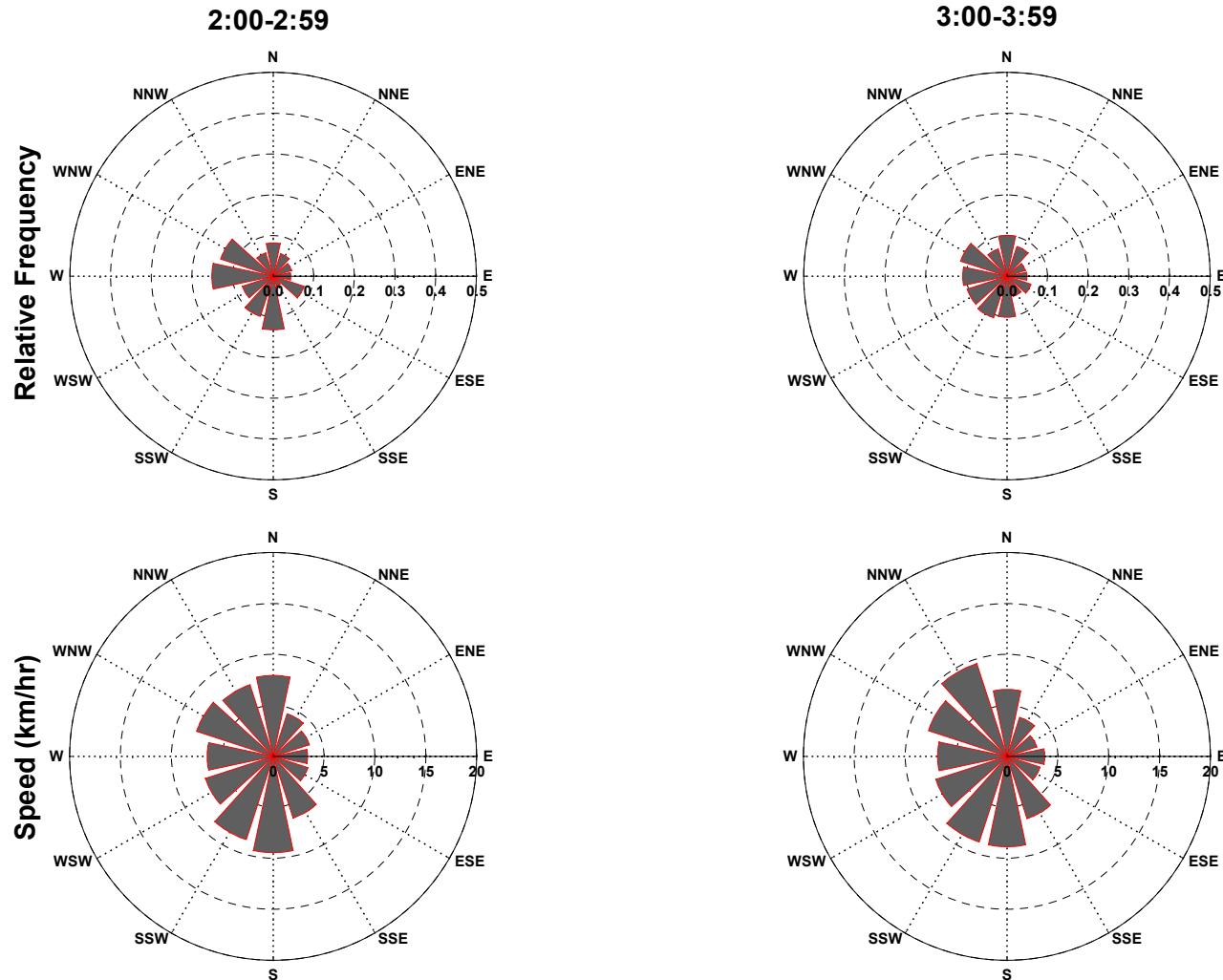
**Figure H12.** Results of towed turbidity data collection. Transect cycles 9 and 10, September 25, 2003. Times are Pacific Daylight Time.

## South San Diego Bay Wind Monitoring



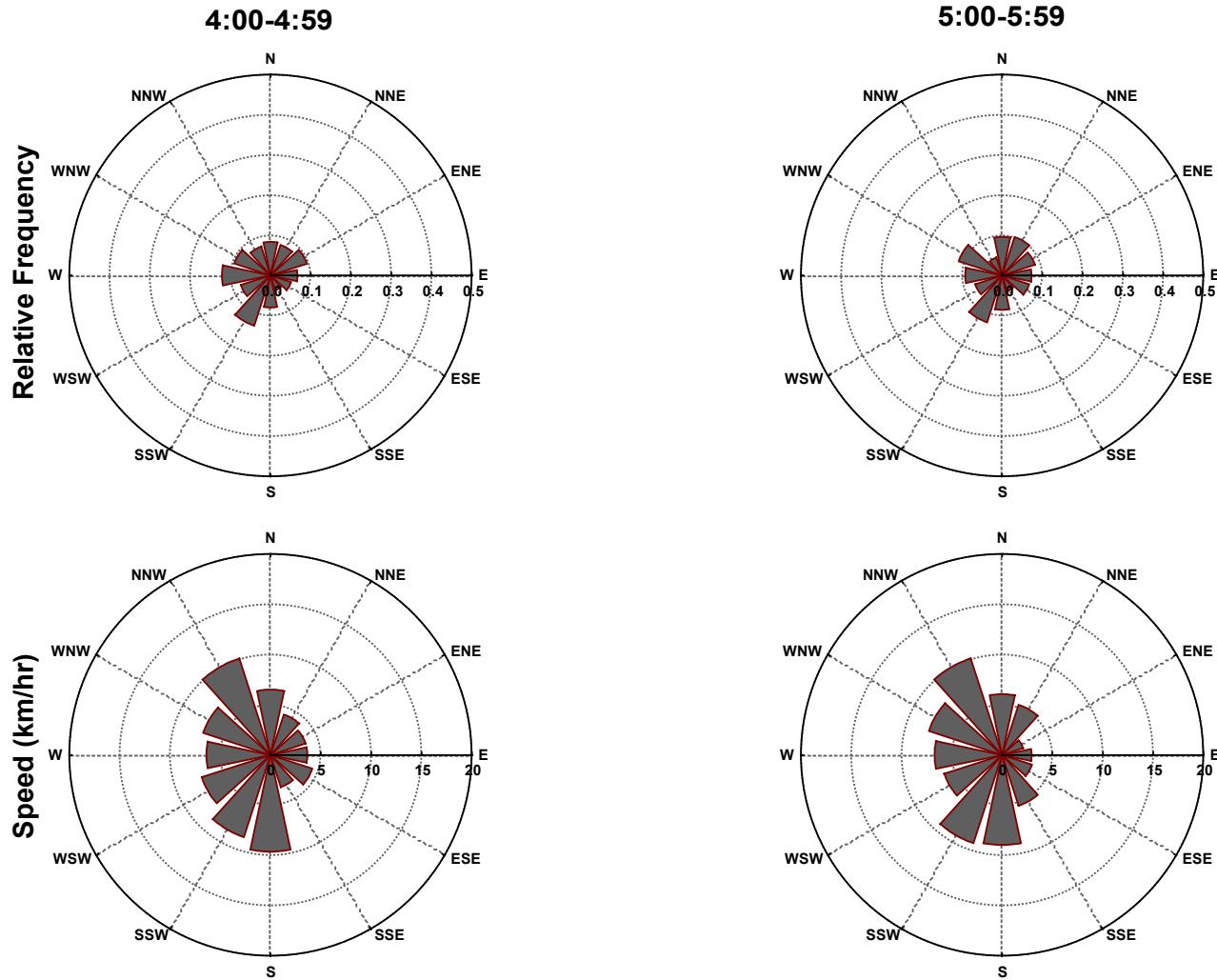
**Figure H13.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 0:00-0:59 (left) and 1:00-1:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



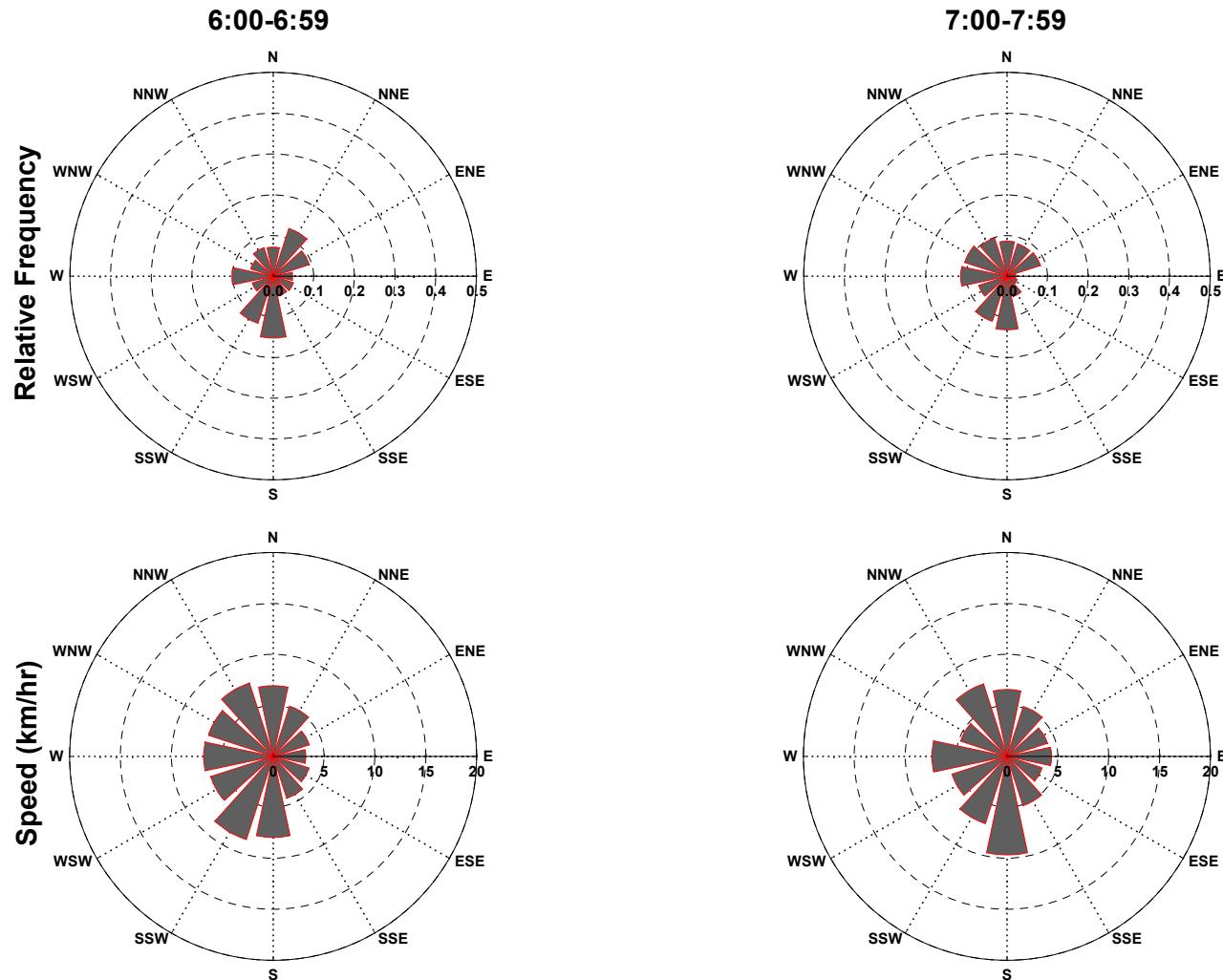
**Figure H14.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 2:00-2:59 (left) and 3:00-3:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



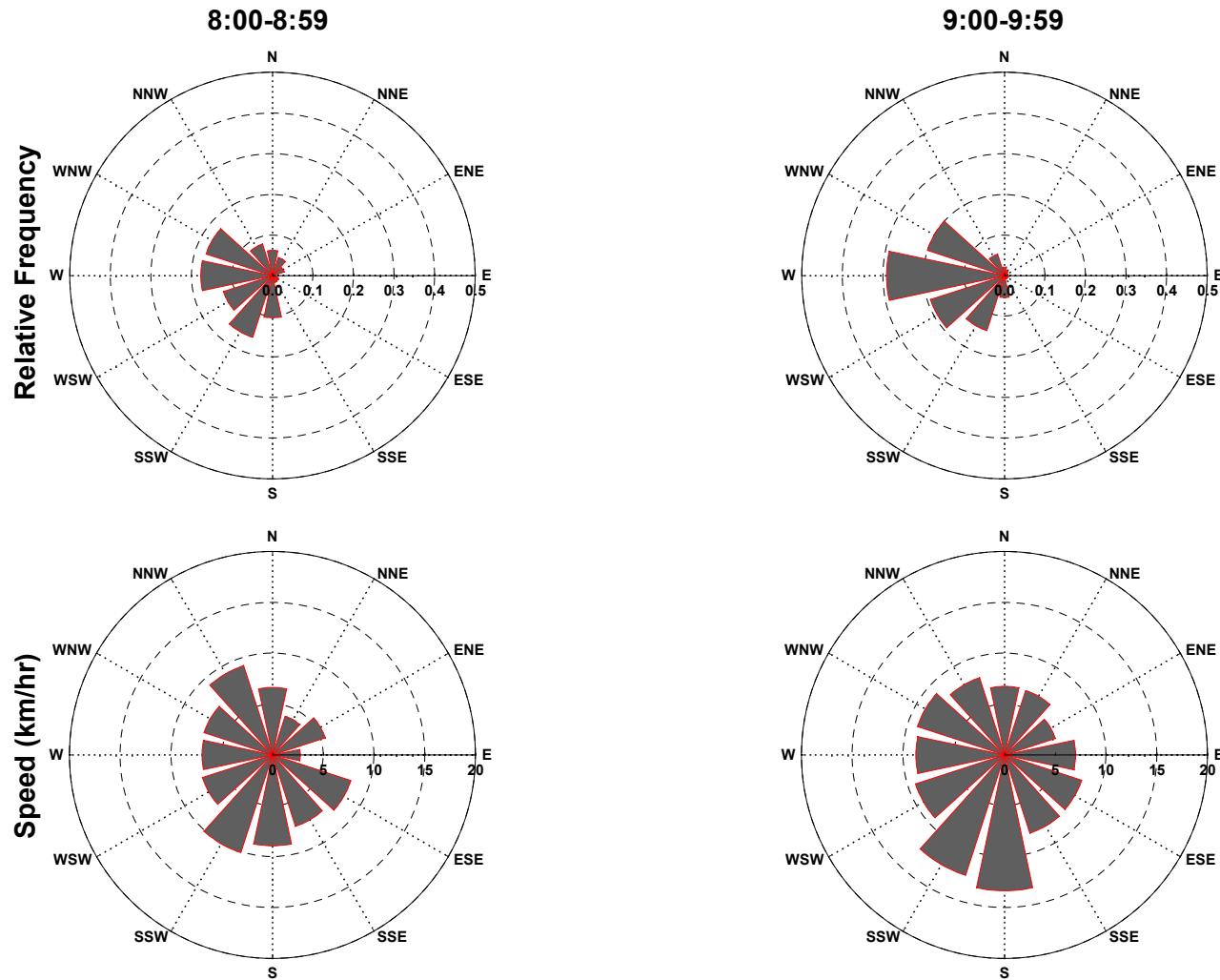
**Figure H15.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 4:00-4:59 (left) and 5:00-5:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



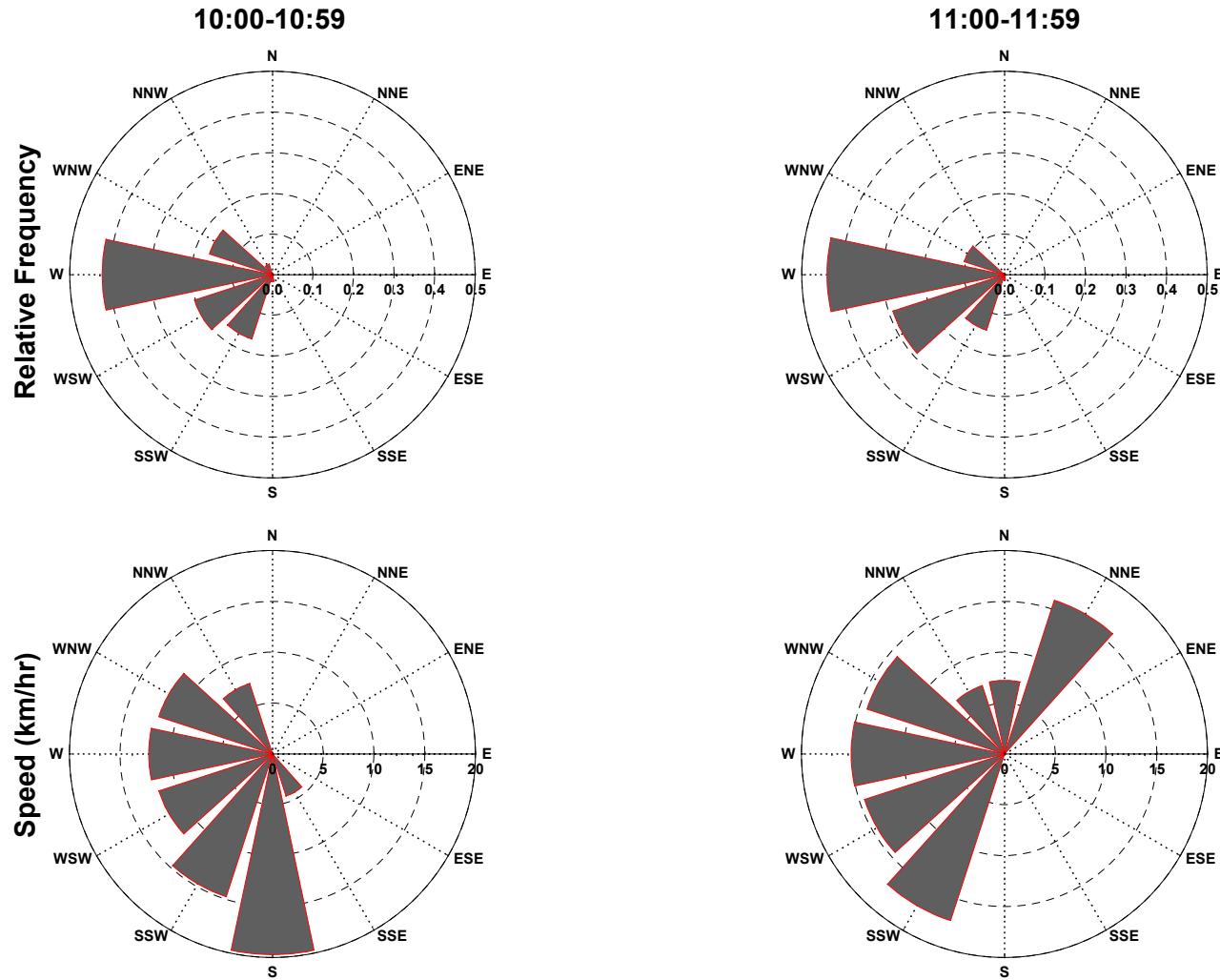
**Figure H16.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 6:00-6:59 (left) and 7:00-7:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



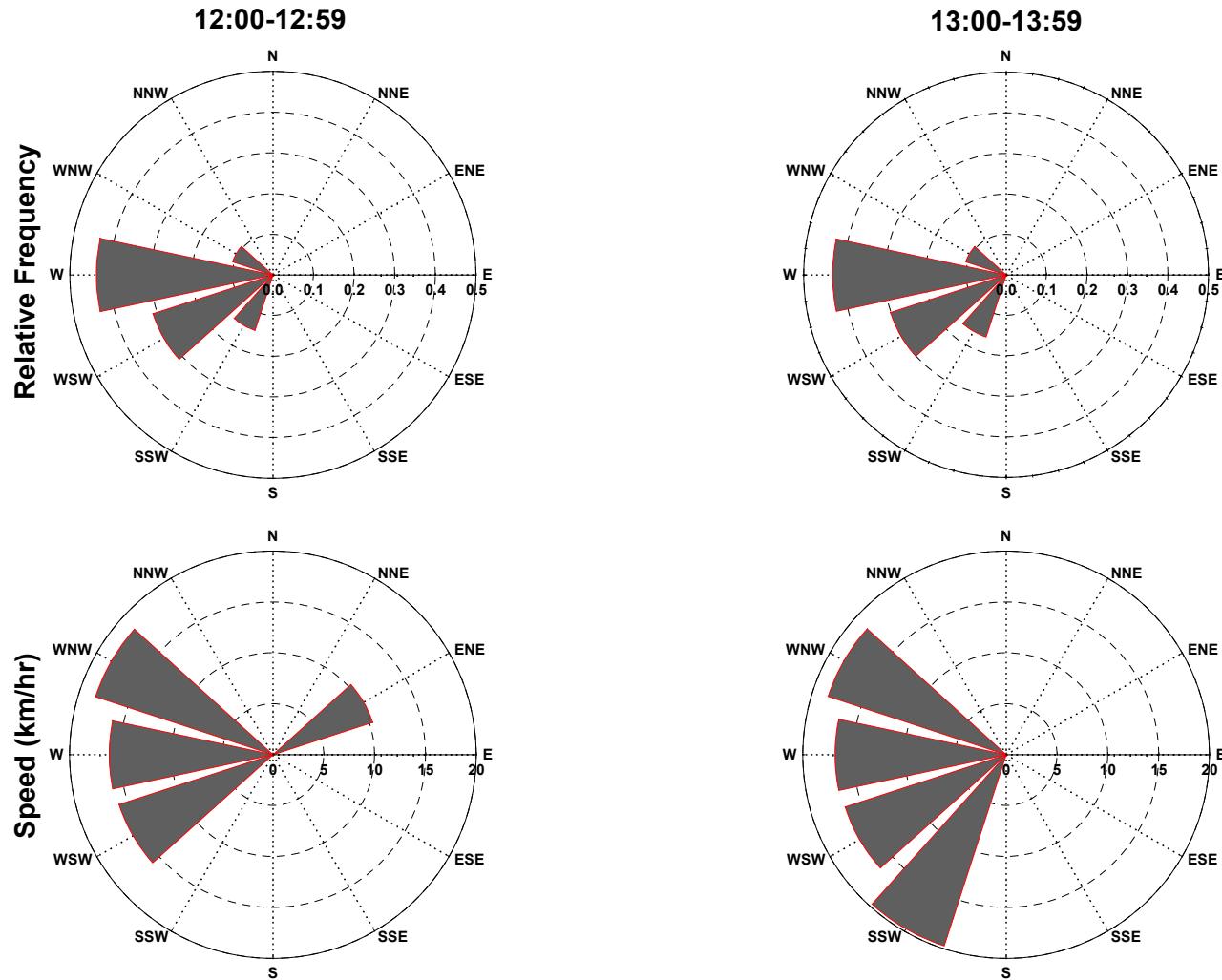
**Figure H17.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 8:00-8:59 (left) and 9:00-9:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



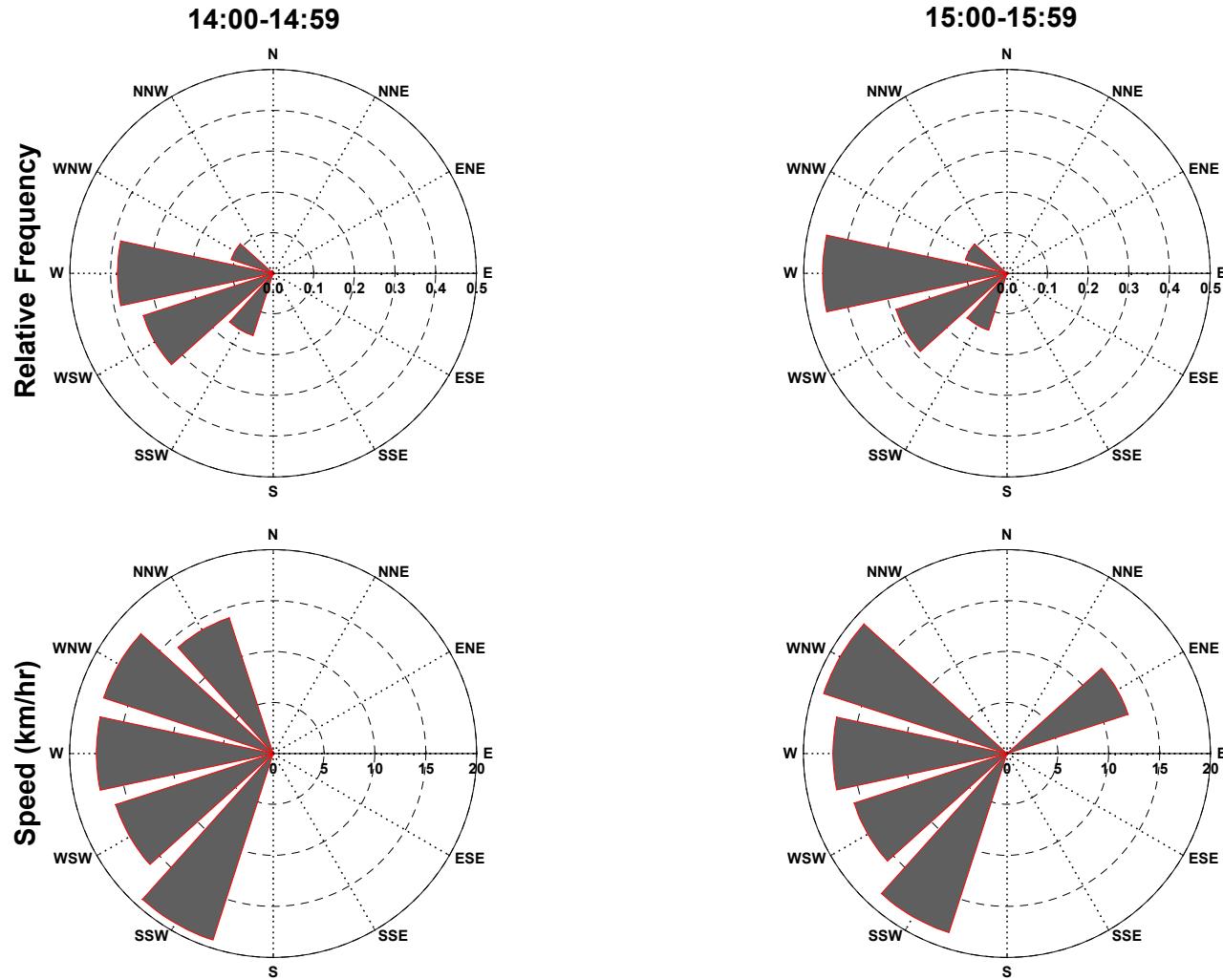
**Figure H18.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 10:00-10:59 (left) and 11:00-11:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



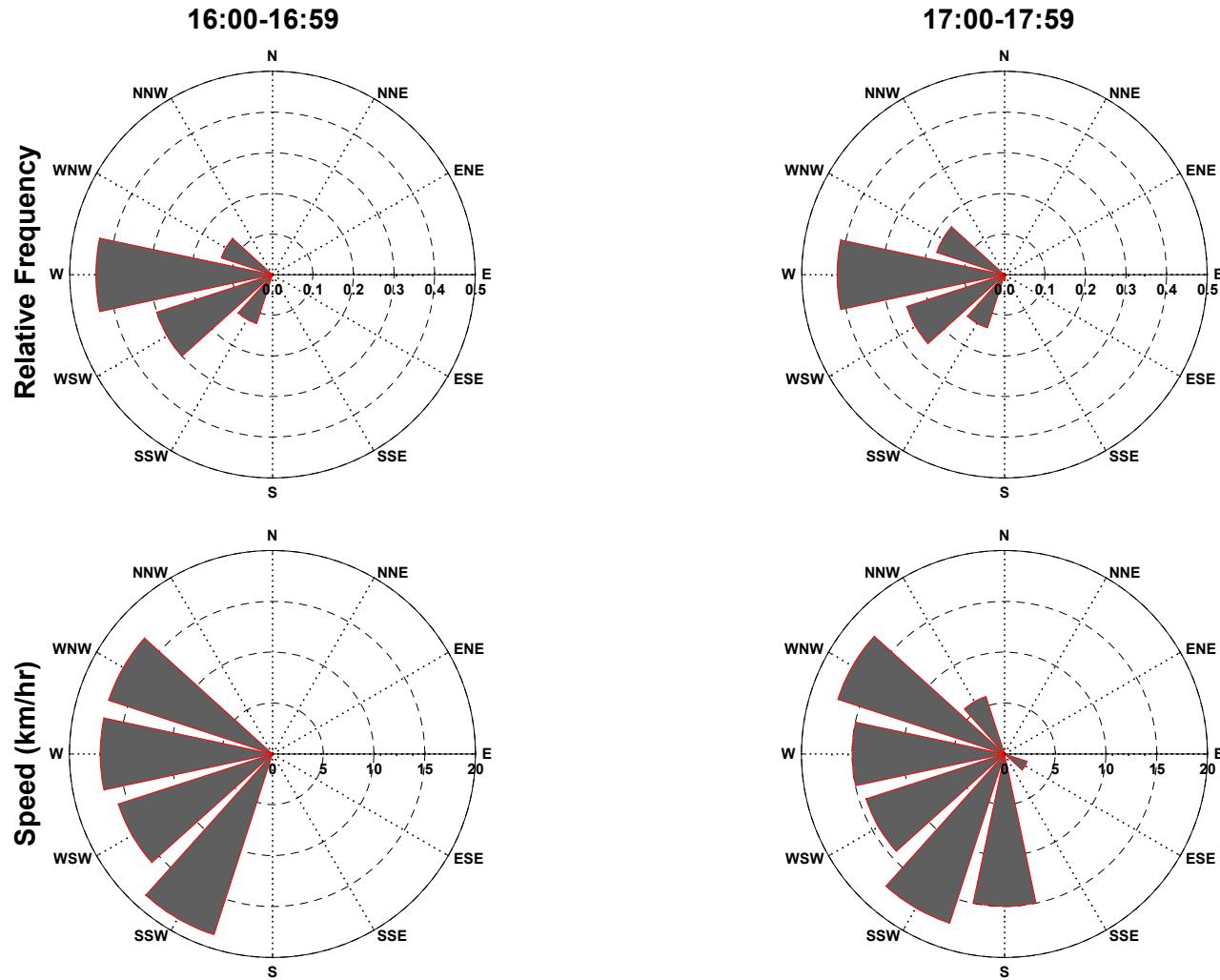
**Figure H19.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 12:00-12:59 (left) and 13:00-13:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



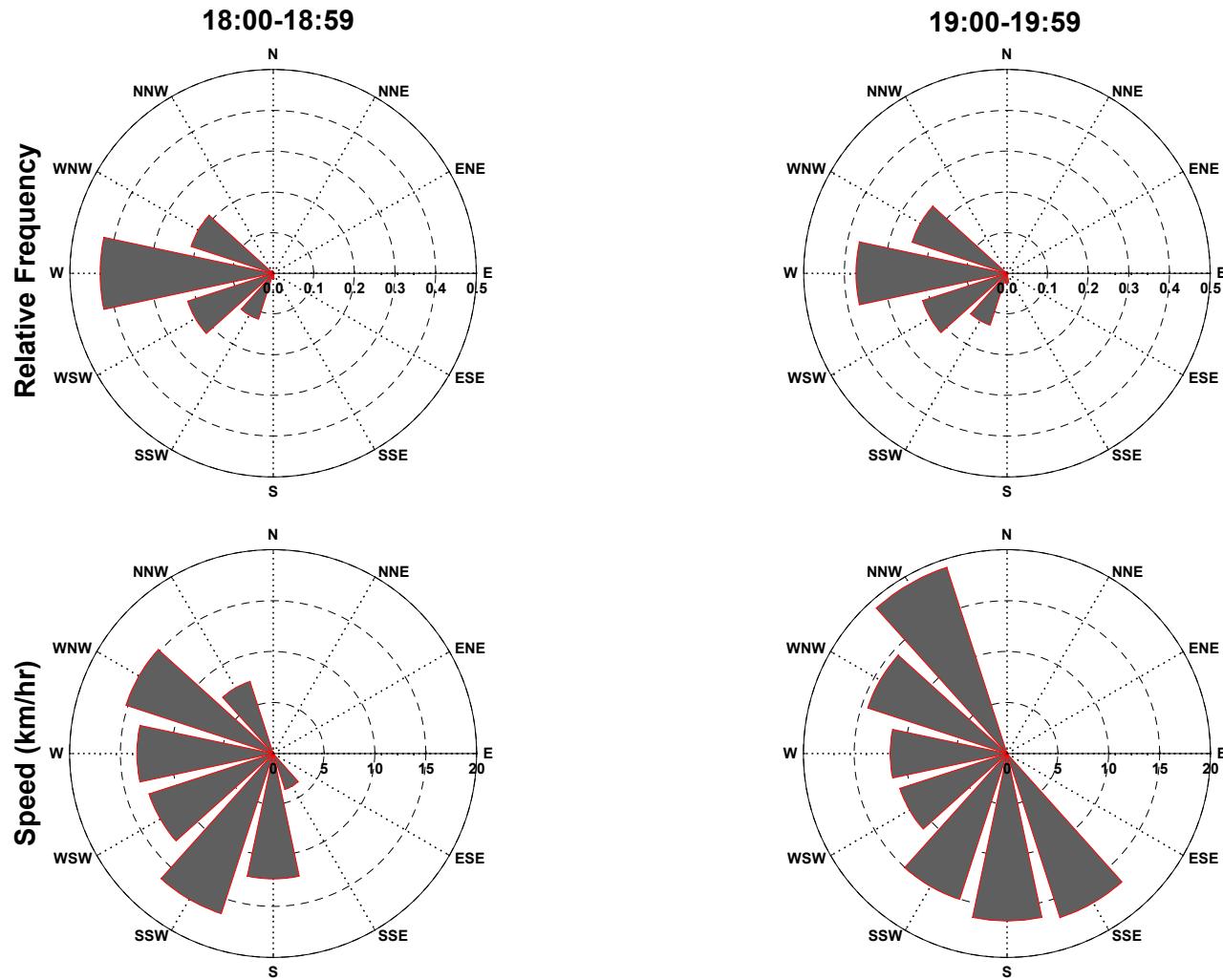
**Figure H20.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 14:00-14:59 (left) and 15:00-15:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



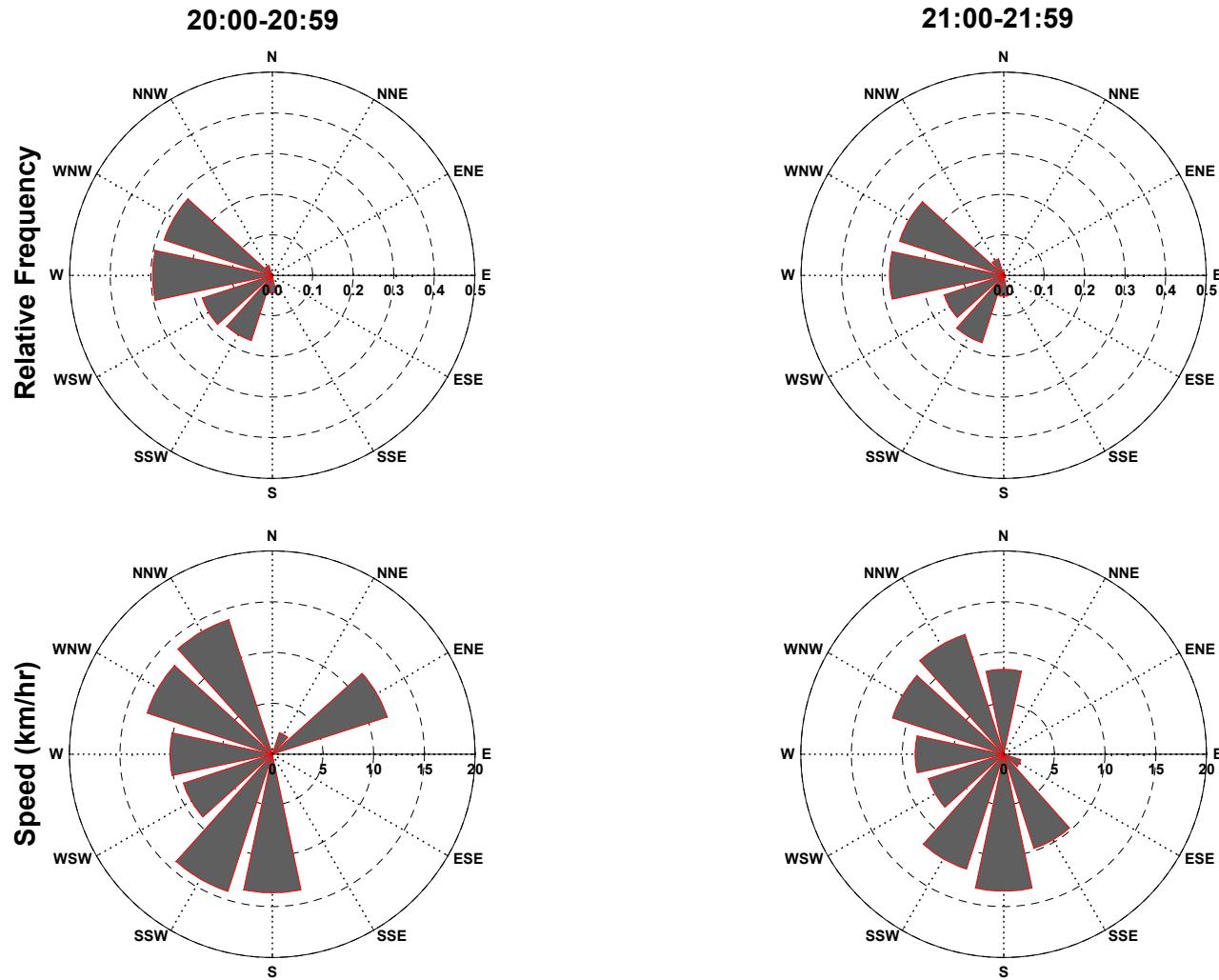
**Figure H21.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 16:00-16:59 (left) and 17:00-17:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



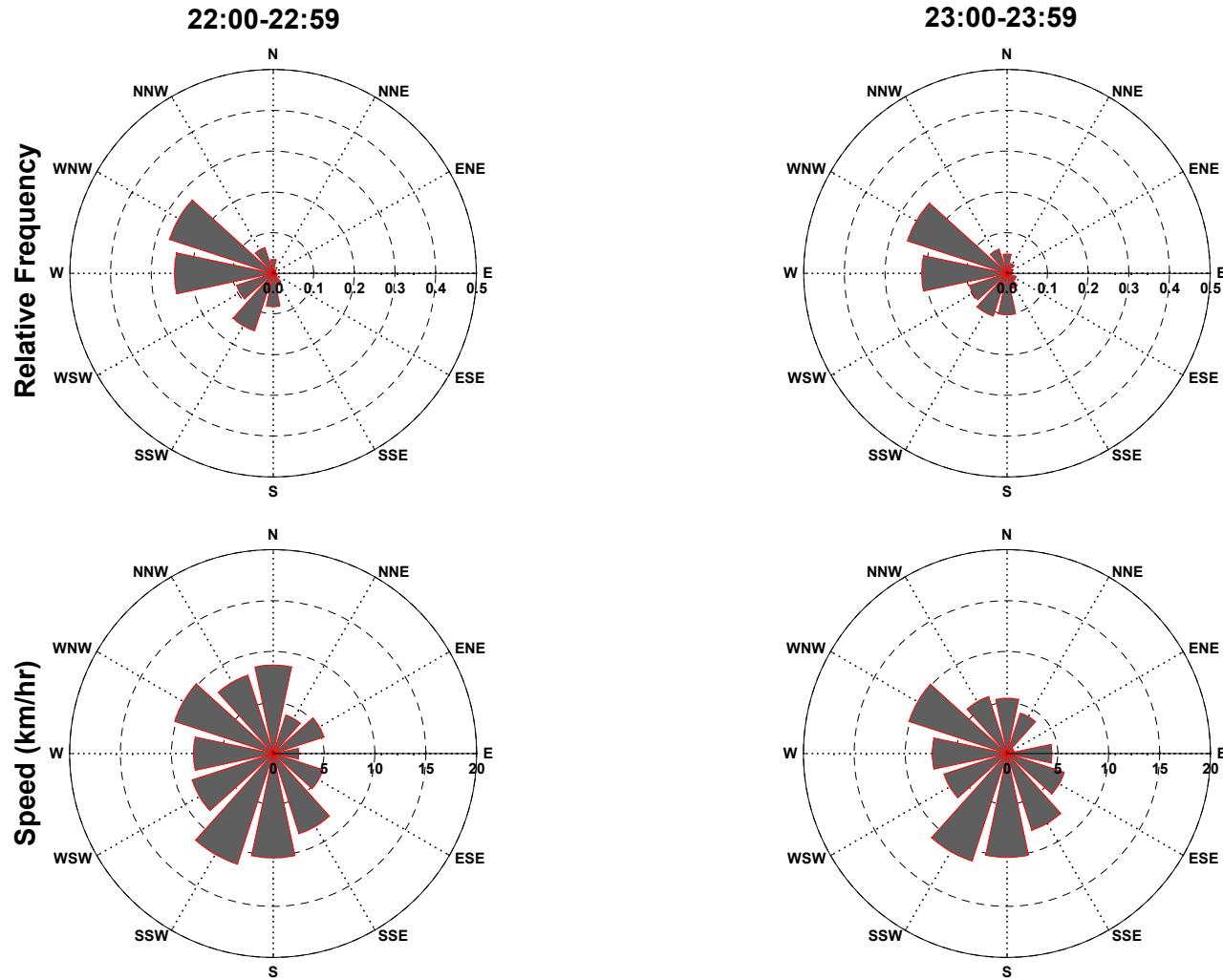
**Figure H22.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 18:00-18:59 (left) and 19:00-19:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



**Figure H23.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 20:00-20:59 (left) and 21:00-21:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

## South San Diego Bay Wind Monitoring



**Figure H24.** Wind roses of relative frequency of wind direction (top), and average wind speed for each wind direction (bottom). Data collected between 22:00-22:59 (left) and 23:00-23:59 (right). Times are Pacific Daylight Time. Data collected on the Chula Vista Wildlife Island (May 25, 2003 through September 30, 2003).

# **Appendix I**

## **Benthic Invertebrate Monitoring Data**

**Table I1.** Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPTE001 (Replicate A), July 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<b>Annelida</b>																						
<i>Armandia brevis</i>	26		3							3			3				2	12	1	2		
<i>Brania medioidentata</i>	4	1											1	1			1					
<i>Capitella capitata</i>	30							2	8	4	2	1					2	4	4	1	1	1
Cirratulidae	2				1				1													
<i>Cirriformia moorei</i>	2											1										1
<i>Cossura pygodaactyla</i>	2															2						
<i>Diplocirrus</i> sp. SD1	4			1						1						2						
<i>Dorvillea (Schistomeringsos)</i> sp.	8	1	1	1	1												4					
<i>Eteone aestuarina</i>	15											1	3	2		5	1		1	1		
<i>Euchone limnicola</i>	4	1	1			1																1
<i>Exogone lourei</i>	108	16		1						6		42				17	26					
<i>Exogone</i> sp. 1	160	3	28	7	7	3	2	3	1	3	2	31	2			13	4	35	6	7	3	
<i>Fabricinuda limnicola</i>	111		7	4	26	7			10	1	7	8			15	22		3	1			
<i>Glycera americana</i>	4				1							1	1						1			
<i>Harmothoe imbricata</i> cmplx.	1								1													
<i>Leitoscolopios pugettensis</i>	234	7	26	47	7	2	2		20	5		3	21	27	25	33	7					2
<i>Mediomastus</i> sp.	1,144	60	80	64	37	40	8	1	56	6	10	88	61	89	91	228	213	4	1	3	4	
<i>Megalomma pigmentum</i>	89		7	6	2	3	3		9	1		3	47	1	6	1						
<i>Monticellina</i> sp.	2														2							
<i>Neanthes acuminata</i> cmplx.	73	1			1	4	10	1	15		1	2				9	18	6	2	1	2	
<i>Neanthes</i> sp.	16										1					1	14					
<i>Odontosyllis phosphorea</i>	13		3									6	1					1	1			1
<i>Pionomis</i> sp. SD1	2								2													
<i>Pista agassizi</i>	25	6	15						2			2										
<i>Polydora cornuta</i>	1								1													
<i>Prionospio heterobranchia</i>	77	20	8	1		3	1		1			23		7	2	4	2	2	4			1
<i>Pseudopolydora paucibranchiata</i>	10	1	1			1			2	1						2	2					
<i>Rhynchospiopsis glutaea</i>	14									1					1	5			7			
<i>Scolelepis</i> sp.	7			1	1	3													2			
<i>Scoletoma</i> sp. A	1	1																				
<i>Scoletoma</i> sp. B	1														1							
<i>Scoletoma</i> sp. C	139	28	23	4	5	1			1	1				36	8	12	7	5	7			1
<i>Scoletoma tetraura</i> cmplx	2	2																				
<i>Scoloplos acmeceps</i>	29							1	5		1	3		1					10	8	1	
<i>Scyphoprocus oculatus</i>	17									10							6					
<i>Spiophanes duplex</i>	1														1							
<i>Streblospio benedicti</i>	39					3				3												33
<i>Timarete</i> sp.	13							1			12											

(continued)

**Table I1(continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPTE001 (Replicate A), July 2003.**

Taxon	Total	Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5	
<b>Arthropoda</b>																								
<i>Acuminodeutopus heteroporus</i>	65	2							13	6				31		2	3	1					1	6
<i>Amphideutopus oculatus</i>	10	1	1			2								4		2								
<i>Amphilochidae</i>	2													2										
<i>Amphilochus</i> sp.	1													1										
<i>Ampithoe</i> spp.	2													1										
<i>Aoridae</i>	11	6												2										3
<i>Bemlos macromanus</i>	14		1																					
<i>Campylaspis rubromaculata</i>	2							1	1															
<i>Caprella californica</i>	28							2		2				1										
<i>Caprella mendax</i>	1													1										
<i>Caprella</i> spp.	3													1										
<i>Corophium</i> sp.	86									68				4									14	
<i>Cumella</i> sp. D	2		1																					1
<i>Elasmopus</i> spp.	3																							3
<i>Erichthonius brasiliensis</i>	7													5										2
<i>Erichthonius difformis</i>	7													7										
<i>Erichthonius</i> sp.	1													1										
<i>Euphilomedes carcarodonta</i>	52			1	2			5		30			11					2						1
<i>Heterophoxus</i> cf. <i>ellisi</i>	37									35			2											
<i>Heteroserolis carinata</i>	3					1				1			1											
<i>Hyale</i> sp.	6									1											2	3		
<i>Idotea</i> spp.	2																					2		
<i>Leptochelia dubia</i>	219		3							86	2		4			1		1	18	86	14		4	
<i>Leptochelidae</i>	45									22									1	7	14	1		
<i>Mayerella acanthopoda</i>	314	2	9	7	6	8	27	1		22	40	1	17	2	2	2	8	109	5		44	4		
<i>Monoculodes hartmanae</i>	24			5	2		3			2		4		2	4									1
<i>Oxyurostylis pacifica</i>	15					1	7					1											4	2
<i>Paracerceis sculpta</i>	32		2							1	5		2					3	19					
<i>Parametopella</i> cf. <i>ninis</i>	5												5											
<i>Paranthuria elegans</i>	7								4	3														
<i>Parasterope bamesi</i>	53	2							3	34			3	2		1						1	1	5
<i>Podocerus brasiliensis</i>	16												16											
<i>Podocerus</i> spp.	7		2										5											
<i>Rudilemboides stenopropodus</i>	36	2	3		1		3			13				1		1			6			4	2	
<i>Rutiderma judayi</i>	56			3	1					47		1	2						2					
<i>Rutiderma rostratum</i>	6		1							3									2					
<i>Rutiderma</i> sp.	23								2	21				1	1									
<i>Synchelidium rectipalmum</i>	2																							

(continued)

**Table I1(continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE001 (Replicate A), July 2003.**

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5		
<b>Molluscs</b>																								
<i>Acteocina inculta</i>	17	1	2					7				6										1		
<i>Barleeia</i> sp./ <i>Assiminea californica</i>	3							1				1												
<i>Crucibulum spinosum</i>	6								1			5												
<i>Lottia depicta</i>	1																				1			
<i>Lyonsia californica</i>	25				1		1	4			2	1	1		6				5		4			
<i>Musculista senhousia</i>	173	30	43		2	5	1	70			1	7	2	1	2	2		5	1		1			
<i>Solen rostriformis</i>	27		2		2	5					2		7	1	3		4			1				
<i>Tellina meropsis</i>	70		7	6	3	2	2	3	6	4	10	3	1	1	1	2	13	3		2	1			
<i>Theora lubrica</i>	4		1					1				1			1									
<i>Thracia curta</i>	1														1									
<b>Other Taxa</b>																								
<i>Amphipholis squamata</i>	26				1	1					5		7	6				6						
<i>Amphiuridae</i> (juv.)	4				1								2					1						
<i>Anoplodactylus viridintestinalis</i>	1							1																
<i>Edwardsia californica</i>	3	2	1																					
<i>Leptosynapta</i> spp.	1						1																	
Nematoda	1,306	63	175	30	1	19	17	657	9	8	20	8	6	88	14	97	84	2	2		4	2		
Nemertea unid.	14								5	1		3			1	3						1		
Oligochaeta	257	4	1	13	1	5	9	18	10	2	5	9	7	7	5	56	34	34	2		11	24		
Phoronida unid.	7		1		2	1													2			1		
<i>Scolanthus</i> sp. B	2	1	1																					
Total:	5,583	264	460	206	117	117	135	965	378	77	196	309	110	364	167	511	600	296	93	21	103	94		

**Table I2. Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPPTE001 (Replicate A), July 2003.**

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
<b>Annelida</b>											
<i>Boccardiella hamata</i>	2							2			
<i>Brania medioidentata</i>	8	4									
<i>Capitella capitata</i>	155		14	3	19	5	4	8	5		97
<i>Chrysopetalum occidentale</i>	1								1		
<i>Cirriformia moorei</i>	8						3		1	2	2
<i>Ctenodrilus serratus</i>	1							1			
<i>Eteone aestuarina</i>	4	1	1							1	1
<i>Eteone californica</i>	5	1			4						
<i>Euchone limnicola</i>	1				1						
<i>Exogone lourei</i>	10				7	3					
<i>Exogone</i> sp. 1	100	8	1	7	4	3	1	5	18	1	52
<i>Fabricinuda limnicola</i>	773	199	2	15	187	365	2	1			2
<i>Glycera americana</i>	3	1		1				1			
<i>Leitoscolopios pugettensis</i>	2						2				
<i>Marpphysa</i> nr. <i>sanguinea</i>	3						1			2	
<i>Mediomastus</i> sp.	95		4	3	2	69	7	1	1	5	3
<i>Megalomma pigmentum</i>	5	1								1	3
<i>Neanthes acuminata</i> Cmplx.	14		2				7				5
<i>Odontosyllis phosphorea</i>	4		1		3						
<i>Polydora cornuta</i>	7						5				2
<i>Polydora websteri</i>	6						3	2			1
<i>Prionospio heterobranchia</i>	8	3	1		1	3					
<i>Pseudopolydora paucibranchiata</i>	86	7			61	4	7	1	3	1	2
<i>Rhynchospius glutaeus</i>	35				1		1	11			22
<i>Scolelepis</i> sp.	4				2		1				1
<i>Scoletoma</i> sp. C	2		2								
<i>Scoloplos acmeceps</i>	25	1	6	4	5	6					3
<i>Scyphoproctus oculatus</i>	1						1				
<i>Spio</i> cf. <i>filicornis</i>	11	2		2	6			1			
<i>Streblospio benedicti</i>	264	87	1	8	35	1	33	21	30	5	43
<b>Arthropoda</b>											
<i>Acuminodeutopus heteruropus</i>	32	12	5	1	7	4					3
<i>Ampithoe</i> cf. <i>plumulosa</i>	1							1			
<i>Ampithoe</i> cf. <i>simulans</i>	2								2		
<i>Ampithoe</i> spp.	7	1			4	2					
<i>Bemlos macromanus</i>	1					1					
<i>Corophium</i> sp.	148	1			19	2	4	1	112	3	6
<i>Curnella</i> sp. D	1									1	
<i>Euphilomedes carcarodontia</i>	203	47	63	19	32	42					
<i>Grandidierella japonica</i>	61			1	23	16	5	2		14	
<i>Leptochelia dubia</i>	497	96	24	25	160	61	3	3	102	21	2
<i>Leptochelidae</i>	90	18	1	6	26	9		22	6	2	
<i>Mayerella acanthopoda</i>	59	11	1	11	5	14		1	5	11	
<i>Oxyurostylis pacifica</i>	7								1		6
<i>Paracerceis sculpta</i>	4						3	1			
<i>Parasterope bamesi</i>	17	7		1	4	5					
<i>Podocerus</i> spp.	1			1							
<i>Podocopid</i>	6	6									
<i>Pontogeneia rostrata</i>	1						1				
<i>Rudilemboides stenopropodus</i>	1		1								
<i>Rutiderma judayi</i>	19		2		10	7					
<i>Rutiderma rostratum</i>	1					1					
<i>Sinelobus stanfordi</i>	3	2									1
<i>Synaptotanais notabilis</i>	6					6					

(continued)

**Table I2 (continued). Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPTE001 (Replicate A), July 2003.**

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
<b>Molluscs</b>											
<i>Acteocina inculta</i>	21	3	18								
<i>Barleeria</i> sp./ <i>Assiminea californica</i>	4					4					
<i>Lyonsia californica</i>	2					2					
<i>Musculista senhousia</i>	16	1	3		7	4					1
<i>Nassarius tiarula</i>	2				1		1				
<i>Solen rostriformis</i>	2								1	1	
<i>Tellina meropsis</i>	28		8		2	12	1				5
<b>Other Taxa</b>											
<i>Anoplodactylus viridintestinalis</i>	1		1								
Nematoda	594	26	53	90	115	15	13	40	18	7	217
Nemertea unid.	2	1							1		
Oligochaeta	733	103	2	4	58	10	120	125	100	3	208
Phoronida unid.	6	4					1			1	
Total:	4,222	654	217	202	820	674	229	224	420	88	694

**Table I3. Mean and standard deviation of benthic invertebrates at subtidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.**

Taxon	Total Mean	SA3		SC3		SD4		SE3		SE4		SE5		SE7		SF2		SF3		SF4		SN2		SR1		SR2		SR3		SR4		SR5	
	Abun.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.												
<b>Annelida</b>																																	
<i>Armandia brevis</i>	130.3	0.3	0.6	4.7	3.1	1.0	1.7	14.7	7.6	1.3	1.5	13.3	9.1	24.0	7.0	2.7	2.1	3.3	4.9	0.7	1.2	43.3	4.6	13.7	15.9								
<i>Brania medioidentata</i>	4.3																																
<i>Capitella capitata</i>	87.3																																
<i>Caulieriella</i> sp.	0.3																																
<i>Chrysopetalum occidentale</i>	1.0																																
<i>Cirratulidae</i>	0.7																																
<i>Cirriformia moorei</i>	6.0																																
<i>Cirriformia</i> spp.	9.0																																
<i>Cossura pygodaetylata</i>	6.7																																
<i>Ctenodrilus serratus</i>	4.3																																
<i>Diplocirrus</i> sp. SD1	9.3	0.3	0.6	5.3	2.5	0.7	0.6			0.7	0.6																						
<i>Dipolydora socialis</i>	0.3																																
<i>Dorvillea</i> ( <i>Schistomerings</i> ) sp.	3.0					2.0	3.5																										
<i>Eteone aestuarina</i>	22.3					3.7	1.2	0.3	0.6	1.0	1.0	0.7	1.2	0.7	1.2			1.3	1.2	1.0	1.0												
<i>Euchone limnicola</i>	0.7																																
<i>Exogone lourei</i>	54.0	0.7	1.2	0.3	0.6													14.0	4.4	12.7	12.5	4.0	4.0	18.7	10.1			11.0	8.7	3.0	2.0		
<i>Exogone</i> sp. 1	145.7	0.3	0.6	9.0	10.6	3.3	3.1	16.0	4.4	1.0	1.7	11.7	8.1	0.7	0.6			35.7	11.7	0.3	0.6	1.0	1.0	6.3	5.9	1.0	1.0	0.3	0.6				
<i>Fabricinuda limnicola</i>	95.0			0.7	0.6	3.3	1.2	27.0	9.5	0.7	1.2																						
<i>Flabelligeridae</i>	0.3																																
<i>Glycera americana</i>	3.7			0.3	0.6	1.0	1.0			0.7	0.6	0.3	0.6																				
<i>Harmothoe imbricata</i> Cmplx.	1.3																																
<i>Leitoscolopios pugettensis</i>	186.3	1.0	1.0	31.7	6.4	26.7	9.5	11.3	3.5	7.3	3.1	1.7	1.2					10.3	11.0	1.7	1.5	1.0	0.0	1.7	0.6	21.0	3.6	17.0	2.3	28.3	8.1	8.7	4.2
Lumbrineridae - post larval	0.3																																
<i>Marphysa</i> sp.	0.3																																
<i>Mediomastus</i> sp.	786.0	32.0	19.3	62.3	33.1	24.7	8.1	37.0	13.2	18.7	4.6	5.0	3.0	5.0	2.6	92.7	15.7	15.7	4.5	28.0	6.0	66.3	12.9	44.3	9.9	81.0	22.3	35.7	15.8	110.3	41.8	101.3	3.5
<i>Megalomma pigmentum</i>	84.7	0.3	0.6	3.0	1.0	3.3	2.5	11.0	2.0	15.0	1.0	4.0	4.4			10.3	3.8	9.7	3.2														
<i>Monticellina</i> sp.	2.0					0.3	0.6																										
<i>Naineris</i> cf. <i>Laevigata</i>	0.3																																
<i>Neanthes acuminata</i> Cmplx.	86.7																																
<i>Neanthes</i> sp.	3.3																																
Nereididae unid.	19.0																																
<i>Notomastus</i> sp.	0.3			0.3	0.6	0.7	1.2	2.3	0.6	1.3	1.2																						
<i>Odontosyllis phosphorea</i>	19.3	0.7	0.6	0.3	0.6	0.7	1.2	2.3	0.6	1.3	1.2					1.3	2.3	0.7	0.6	0.7	1.2	3.3	1.5	0.3	0.6	1.0	1.0						
Oligochaeta	648.3	1.0	1.0	4.0	5.3	3.7	2.3	7.7	4.0	3.7	1.5	53.0	49.2	221.3	103.1	80.0	47.7	6.3	6.7	22.0	7.8	6.7	4.9	8.0	6.2	15.0	14.9	6.3	8.4	9.0	13.9	6.7	3.8
<i>Pionosyllis</i> sp. SD1	0.3																																

**Table I3 (continued).** Mean and standard deviation of benthic invertebrates at subtidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

**Table I3 (continued).** Mean and standard deviation of benthic invertebrates at subtidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

**Table I4.** Mean and standard deviation of benthic invertebrates at intertidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

Taxon	Abun.	Total		IR1		IR2		IR3		IR4		IR5		IT1		IT2		IT3		IT4		IT5					
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.				
<b>Annelida</b>																											
<i>Armandia brevis</i>	13.0							5.0	5.0	2.0	3.5	0.7	0.6					1.0	1.0	2.7	2.9	1.7	1.2				
<i>Boccardiella hamata</i>	0.3																			0.3	0.6						
<i>Brania medioidentata</i>	13.7	2.7	2.9	8.3	13.6					1.0	1.7	1.7	1.5														
<i>Capitella capitata</i> cmplx.	52.3	1.7	1.5	4.0	3.6	1.0	1.7	10.0	9.5	11.3	6.8	1.3	1.5	3.0	1.7	0.7	1.2	1.0	1.0	18.3	12.3						
<i>Chone</i> sp.	0.7	0.3	0.6					0.3	0.6																		
<i>Chrysopetalum occidentale</i>	0.3																			0.3	0.6						
<i>Cirriformia moorei</i>	4.7																		2.0	2.0	0.3	0.6	1.0	0.0			
<i>Cirriformia</i> spp.	0.3																				0.3	0.6					
<i>Eteone aestuarina</i>	3.3	0.3	0.6																			1.0	1.0				
<i>Eteone californica</i>	0.3	0.3	0.6																								
<i>Exogone lourei</i>	2.7																										
<i>Exogone</i> sp. 1	60.7	3.0	2.6			2.7	1.2					2.7	2.5							1.0	1.0	5.3	0.6	48.7	57.6		
<i>Fabricinuda limnicola</i>	364.7	51.0	31.5	1.0	1.0	26.3	14.5	91.3	46.2	192.3	67.3			0.3	0.6	1.7	2.9			0.7	1.2						
<i>Glycera americana</i>	0.7							0.3	0.6			0.7	1.2														
<i>Harmothoainae</i>	0.3																										
<i>Leitoscolopios pugettensis</i>	1.0	0.7	0.6			0.3	0.6																				
<i>Marpysa</i> sp.	3.7																			2.3	2.5	0.7	0.6				
<i>Mediomastus</i> sp.	36.7	1.0		3.0	1.0	6.3	4.5					17.7	4.9	1.0					2.7	0.6	2.3	0.6	2.7	2.5			
<i>Megalomma pigmentum</i>	9.3	0.7	1.2			0.7	0.6															8.0	9.5				
<i>Neanthes acuminata</i> Cmplx.	8.3	0.3	0.6	0.3	0.6	1.0	1.0	0.3	0.6			0.3	0.6	1.3	1.2	1.0	1.0			2.0	1.7	0.7	1.2	3.7	2.5		
<i>Neanthes</i> sp.	2.7																										
<i>Odontosyllis phosphorea</i>	1.3	0.3	0.6			0.7	0.6					0.3	0.6	1.3	1.2	1.0	1.0										
<i>Paraonella platybranchia</i>	0.3	0.3	0.6																								
<i>Piromis</i> sp. SD1	0.3											0.3	0.6														
<i>Polydora cornuta</i>	1.7											1.0	1.7							0.3	0.6		0.3	0.6			
<i>Polydora</i> spp.	0.7																			0.7	0.6						
<i>Polydora websteri</i>	20.7											6.7	4.0	0.3	0.6	10.0	6.2	2.3	0.6	1.3	2.3						
<i>Polyopthalmus pictus</i>	0.3																				0.3	0.6					
<i>Prionospio heterobranchia</i>	3.3	0.3	0.6					1.7	1.2	1.3	1.2																
<i>Pseudopolydora paucibranchiata</i>	8.3	1.7	1.5			0.7	1.2	3.7	2.1	0.7	0.6	0.3	0.6	0.3	0.6					0.7	0.6	0.3	0.6				
<i>Rhynchospio glutaea</i>	18.0													0.3	0.6									17.7	12.9		
<i>Sabellidae</i>	0.7	0.7	1.2																								
<i>Scolelepis</i> sp.	2.3																		0.3	0.6			2.0	2.0			
<i>Scoletoma</i> sp. A	0.3	0.3	0.6																								
<i>Scoletoma</i> sp. C	0.7			0.3	0.6			0.3	0.6																		
<i>Scoloplos acmeceps</i>	25.3	4.7	3.8	2.3	0.6	3.7	3.5	7.7	2.9	3.3	1.5									1.7	1.2	2.0	1.7				
<i>Scyphoproctus oculatus</i>	0.3									0.3	0.6																
<i>Spioph. cf. filicornis</i>	2.3	0.7	1.2					0.7	0.6									1.0	1.0								
<i>Streblospio benedicti</i>	35.0	6.0	2.0					3.7	4.0			2.7	1.5	4.7	2.3	0.3	0.6	1.7	0.6	16.0	17.3						

(continued)

**Table I4 (continued). Mean and standard deviation of benthic invertebrates at intertidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.**

Taxon	Total																														
	Mean	Abun.	IR1	Mean	S.D.	IR2	Mean	S.D.	IR3	Mean	S.D.	IR4	Mean	S.D.	IR5	Mean	S.D.	IT1	Mean	S.D.	IT2	Mean	S.D.	IT3	Mean	S.D.	IT4	Mean	S.D.	IT5	Mean
<b><u>Arthropoda</u></b>																															
<i>Acuminodeutopus heteruropus</i>	25.7	3.0	3.0	13.0	9.2	3.7	3.2			5.7	5.5										0.3	0.6									
<i>Ampithoe</i> cf. <i>Plumulosa</i>	3.3									0.3	0.6	2.7	3.8							0.3	0.6										
<i>Bemlos macromanus</i>	9.7			0.3	0.6	0.3	0.6			9.0	10.1									0.3	0.6										
<i>Betaeus</i> sp.	0.3																			0.3	0.6										
<i>Caprella californica</i>	0.3								0.3	0.6																					
<i>Caprella</i> spp.	2.0			0.3	0.6	0.7	1.2													0.7	1.2	0.3	0.6								
<i>Corophium</i> sp.	92.0	12.3	7.2	1.7	0.6	17.3	9.6	1.0	1.7	1.0	1.0	0.7	1.2	0.7	0.6	17.3	6.7	25.3	4.0	14.7	13.9										
<i>Cumella</i> sp. D	1.7	0.3	0.6			0.7	1.2			0.3	0.6											0.3	0.6								
<i>Elasmopus</i> spp.	1.0					1.0	1.7																								
<i>Erichthonius brasiliensis</i>	4.3	0.3	0.6							3.3	2.9											0.3	0.6	0.3	0.6						
<i>Euphilomedes carcarodonta</i>	194.0	26.0	13.5	111.3	19.6	21.3	11.2	25.0	28.2	10.3	3.8																				
<i>Grandidierella californiensis</i>	3.0					3.0	5.2																								
<i>Grandidierella japonica</i>	115.0	2.7	3.1	4.0	2.6	1.0	1.7	0.7	0.6	8.0	9.6	4.7	1.5	3.7	2.5	70.3	16.0	19.7	1.5	0.3	0.6										
<i>Hyale</i> sp.	6.0					2.0	2.0	0.3	0.6	3.7	2.5																				
<i>Idotea</i> spp.	0.3									0.3	0.6																				
<i>Isaeidae</i>	0.3																			0.3	0.6										
<i>Leptochelia dubia</i>	680.3	91.3	26.2	56.3	18.6	128.7	36.8	148.0	135.2	73.3	60.0									25.0	5.6	71.0	10.4	86.7	54.0						
<i>Leptocheliidae</i>	99.0	13.3	2.5	5.0	3.0	22.0	9.6	23.0	24.0	8.0	3.6	0.3	0.6							2.0	2.0	14.0	7.0	11.3	7.1						
<i>Mayerella acanthopoda</i>	128.7	6.3	7.8	6.7	8.1	19.3	20.6	0.3	0.6	12.3	11.4											3.3	2.5	80.3	119.8						
<i>Melitidae</i>	4.0					2.7	4.6			1.3	1.2																				
<i>Neotrypaea californiensis</i>	0.3			0.3	0.6																										
<i>Oxyurostylis pacifica</i>	2.7																														
<i>Paracerceis sculpta</i>	4.3			0.3	0.6	0.7	1.2			1.3	1.5	0.3	0.6							0.3	0.6	1.0	1.0	0.3	0.6						
<i>Parametopella</i> cf. <i>Ninis</i>	0.3					0.3	0.6																								
<i>Paranthuria elegans</i>	0.3			0.3	0.6																										
<i>Parasterope bamesi</i>	56.3	24.7	18.0	1.7	0.6	14.0	10.5	2.3	1.5	13.7	8.0																				
<i>Philomedes</i> sp.	1.0									1.0	1.0																				
<i>Podocerus</i> spp.	12.3	0.3	0.6	0.7	1.2	11.3	4.6	0.7	1.2	0.3	0.6	0.3	0.6																		
<i>Podocopid</i>	3.3	0.3	0.6	0.3	0.6	0.3	0.6	0.7	1.2																						
<i>Rudilemboides stenopropodus</i>	0.3									0.3	0.6																				
<i>Rutiderma judayi</i>	18.7	1.7	1.5	3.3	2.1			3.3	5.8	10.3	6.7																				
<i>Rutiderma lomae</i>	5.0	0.3	0.6	0.7	1.2			2.7	4.6	1.3	2.3																				
<i>Rutiderma rostratum</i>	1.0	0.3	0.6					0.7	1.2			5.0	7.8																		
<i>Rutiderma</i> sp.	5.0																														
<i>Stomatopoda</i>	0.3					0.3	0.6			4.0	2.6																				
<i>Synaptotanais notabilis</i>	4.0																														
<i>Synaptotanais</i> sp.	0.3									0.3	0.6																				
<i>Tethygenia opata</i>	1.0																		1.0	1.0											

(continued)

Table I4 (continued). Mean and standard deviation of benthic invertebrates at intertidal stations in south San Diego Bay, Survey SBPPTE002, August 2003.

Taxon	Total			IR1			IR2			IR3			IR4			IR5			IT1			IT2			IT3			IT4			IT5		
	Mean	Abun.	Mean	Mean	S.D.	Mean	Mean	S.D.	Mean	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.												
<b>Mollusca</b>																																	
<i>Acteocina inculta</i>	5.0																												0.7	1.2			
<i>Barleeria</i> sp./ <i>Assiminea californica</i>	38.3	0.3	0.6				2.3	2.5	12.3	13.7	23.3	27.1							2.0	3.5	2.3	4.0											
<i>Cecina</i> sp.	0.3						0.3	0.6																									
<i>Chione californiensis</i>	1.7																																
<i>Lyonsia californica</i>	1.7	0.3	0.6				0.7	1.2	0.3	0.6																	0.3	0.6					
<i>Musculista senhousia</i>	59.0	1.0	1.0	0.3	0.6	4.0	6.9	1.3	1.2	2.3	1.5	42.7	73.9							1.3	1.5	3.7	0.6	2.3	2.3								
<i>Solen rostriformis</i>	1.7			0.3	0.6	0.3	0.6	0.3	0.6	0.7	1.2																						
<i>Tagelus subteres</i>	13.3	0.7	1.2			0.3	0.6	1.3	0.6			2.0	2.6	3.0	2.6	0.7	1.2									5.3	8.4						
<i>Tellina meropsis</i>	34.7			4.3	0.6	0.3	0.6	1.3	1.5	5.0	2.6	9.0	4.0	3.3	4.9	2.7	2.3									8.7	14.2						
<b>Other Taxa</b>																																	
<i>Amphipholis squamata</i>	0.3						0.3	0.6																									
<i>Anoplodactylus viridintestinalis</i>	0.3																		0.3	0.6													
<i>Diadumene</i> spp.	2.0								0.7	0.6	1.3	2.3																					
<i>Edwardsia californica</i>	0.7								0.7	1.2																							
<i>Halcampidae</i> (juv.)	1.0																											1.0	1.7				
<i>Leptosynapta</i> spp.	0.3								0.3	0.6																							
<i>Limnactiniidae</i> sp. A	0.3																		0.3	0.6													
<i>Molgula</i> sp.	0.3																	0.3	0.6														
Nematoda	258.7	2.7	3.1	53.0	67.7	31.7	11.0	22.3	22.2	13.7	12.5	2.7	2.5	2.3	3.2	2.3	0.6	6.3	2.1	121.7	113.6												
Nemertea unid.	1.3																			0.3	0.6	1.0	1.0										
Oligochaeta	175.3	27.0	10.4	6.7	10.7	4.7	1.5	1.7	0.6	8.0	2.0	26.3	29.2	12.3	4.5	8.3	3.1	15.0	7.2	65.3	39.2								0.3	0.6			
Ophiuroid arm fragment	0.3																																
Phoronida unid.	26.0	4.7	5.0	2.0	1.7	0.3	0.6	0.7	0.6	1.0	1.0	7.7	10.0	5.0	1.0	0.3	0.6	4.0	2.0	0.3	0.6												
Rhabdocoela	0.3																											0.3	0.6				

**Table I5. Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPTE003 (Replicate A), September 2003.**

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<b><u>Annelida</u></b>																						
Aoridae	2	1																1				
<i>Armandia brevis</i>	132	3	3	9	24	1	7	22	10	5		2	1	6		8	18	2	1	1	3	6
<i>Boccardiella hamata</i>	5							3										2				
<i>Brania mediodentata</i>	15	1						1	3			1					7	2				
<i>Capitella capitata</i>	355				4	5	18	181	7	6	6							80	23	15	7	3
Cirratulidae	37							37														
<i>Cirriformia moorei</i>	55							52			1								2			
<i>Cirriformia</i> spp.	79							79														
<i>Cossura pygodactylata</i>	5											3		2								
<i>Ctenodrilus serratus</i>	274						5	224										22	10	13		
<i>Diplocirrus</i> sp. SD1	10		7		1												2					
<i>Dipolydora socialis</i>	36							26										8	1	1		
<i>Dorvillea (Schistomeringsos)</i> sp.	6	1	5																			1
<i>Eteone aestuarina</i>	22	1	1		4	4	1					3		3			5		1	1		
<i>Exogone lourei</i>	51	4										4				9	31					
<i>Exogone</i> sp. 1	315	13	25	3	19	15	28	21		3	15	3	1			9	27	50	19	16	39	12
<i>Fabricinuda limnicola</i>	74		2		26	2			23							14	6					1
Harmothoinae	1															1						
<i>Leitoscolopios pugettensis</i>	134	1	20	22	6	6			9		5	25	7	6	22	4						1
<i>Marphysa</i> sp.	4							1								2	1					
<i>Mediomastus</i> sp.	941	64	59	12	43	19	16	34	51	34	16	32	58	11	23	173	267	16		6	3	4
<i>Megalomma pigmentum</i>	81	1	6	5	17	11	2		6	18			4	1		4				1	5	
<i>Neanthes acuminata</i> complex.	54	1	1				1	17	5		2	1		2		11	5	5			1	2
<i>Neanthes</i> sp.	16						4	2	5				1			3	1					
<i>Odontosyllis phosphorea</i>	39			1	1		1	5		1		1				3	11	12	1	1		1
<i>Piomis</i> sp.	5								3								2					
<i>Piomis</i> sp. SD1	5								1							1	1		2			
<i>Pista agassizi</i>	5	2							3													
<i>Prionospio heterobranchia</i>	27	3	3		4			2	3	1		8				1	2					
<i>Pseudopolydora paucibranchiata</i>	3			1					2													
<i>Rhynchospiopsis glutaea</i>	73		2	1	4	1				1		3				4	1	9	40	6	1	
<i>Scolelepis</i> sp.	29					3				3								7	12	3	1	
<i>Scoletema</i> sp. A	1											1										
<i>Scoletema</i> sp. B	1	1																				
<i>Scoletema</i> sp. C	129	42	10	9	2				1	1			5	5	8	9	7	30				
<i>Scoletema tetraura</i> complex.	3	3																				
<i>Scoloplos acmeceps</i>	3										1									2		
<i>Scyphoprocus oculatus</i>	17															7	10					
<i>Spio</i> cf. <i>filicornis</i>	2							1											1			
<i>Streblospio benedicti</i>	115						42	5			3							44	5		3	13
<i>Timarete</i> sp.	26										17										9	
<i>Typosyllis</i> sp.	23						22										1					

(continued)

Table I5 (continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE003 (Replicate A), September 2003.

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<b>Arthropoda</b>																						
<i>Acuminodeutopus heterurus</i>	89	16	25	1	2				7			14	14	1	1	7	1					
<i>Amphideutopus oculatus</i>	9		2									7										
<i>Ampithoe cf. plumulosa</i>	1											1										
<i>Bemlos macromanus</i>	10								1			1						2	6			
<i>Caprella</i> spp.	1										1											
<i>Corophium</i> sp.	63								30	1	17							5	1	4	5	
<i>Cumella</i> sp. D	1									1												
<i>Elasmopus</i> spp.	4				1					3												
<i>Erichthonius brasiliensis</i>	13							1		2		4	1		1	5						
<i>Erichthonius</i> sp.	1								1													
<i>Euphilomedes carcarodonta</i>	8		3									1	1	1			2		2	2	1	
<i>Grandidierella japonica</i>	17								12									2	2	1		
<i>Heterophoxus</i> cf. <i>ellisi</i>	4	1								3												
<i>Heteroserolis carinata</i>	4	1										2					1					
<i>Leptochelia dubia</i>	163	2	2	2	3	1			4	1	3		2	1	15	93	4		15	15		
Leptocheliidae	22	1			2					1			2	2	2	8		4	4	2		
<i>Mayerella acanthopoda</i>	348	14	7	69	5		3	2		97	15	3	5	5	8	31	4	1	1	38	40	
Melitidae	9															9						
<i>Monoculodes hartmanae</i>	4											4										
<i>Oxyurostylis pacifica</i>	6			4								2										
<i>Paracerceis sculpta</i>	9		2						2	4		1										
<i>Parametopella</i> cf. <i>ninis</i>	5											5										
<i>Paranthura elegans</i>	2									1		1										
<i>Parasterope bamesi</i>	19	2								5	3	2				1	6					
<i>Podocerus</i> spp.	29		1	1				5			21				1							
Podocopid	4					1			2			1										
<i>Rudilemboides stenopropodus</i>	115	20		1			1					11		2		8	72				1	
<i>Rutiderma judayi</i>	59				3	1			24		10	2		1		7	11					
<i>Rutiderma</i> sp.	15								13			2										
<i>Synchelidium rectipalmum</i>	1	1																				

(continued)

**Table I5 (continued). Benthic invertebrate counts at subtidal stations in south San Diego Bay, Survey SBPPTE003 (Replicate A), September 2003.**

Taxon	Total Count	SA3	SC3	SD4	SE3	SE4	SE5	SE7	SF2	SF3	SF4	SN2	SR1	SR2	SR3	SR4	SR5	ST1	ST2	ST3	ST4	ST5
<b>Molluscs</b>																						
<i>Acteocina inculta</i>	39					1		1	8	16	10		2	1								
<i>Barleeria sp./Assiminea californica</i>	48							4	37		3		1	1				2	1			
<i>Cecina</i> sp.	1										1											
<i>Crucibulum spinosum</i>	54										1	52										1
<i>Lyonsia californica</i>	15			1	1	1	1			3	1	1	2	1			2				1	
<i>Macoma nasuta</i>	1							1														
<i>Musculista senhousia</i>	424	51	2	1		2	1	295		1	23				6		1	31	7	2		1
<i>Nassarius tiarula</i>	1			1																		
<i>Solen rostriformis</i>	1		1																			
<i>Tagelus subteres</i>	11									3	3								2	1	2	
<i>Tellina meropsis</i>	380	3	12	11	10	15	15	52	3	17	18	8	30	10	4	76	40	27	10	17	2	
<i>Theora lubrica</i>	11	2	3						1			2				2	1					
<i>Thracia curta</i>	3		3																			
<b>Other Taxa</b>																						
<i>Amphipolis squamata</i>	23		1		1					1	3	8	1			1	1	7				
Amphiuridae (juv.)	4										1	1	1				1	1	1			
<i>Anoplodactylus</i> sp.	1								1													
<i>Anoplodactylus viridintestinalis</i>	1								1													
Aplousobranchia	1																			1		
<i>Diadumene</i> spp.	15	1							2			8						2			2	
<i>Edwardsia californica</i>	2		1													1						
<i>Harmothoe hirsuta</i>	2								1									1				
<i>Listriella</i> sp.	1	1																				
Nematoda	6,245	131	148	6		6		4,762	17	38	25			2	1	162	528	287	2	2	114	14
Nemertea unid.	13	1			2		1	3	1			2					2			1		
Oligochaeta	1,140	3	12	8	15	5	101	241	69	9	13	15	3			81	23	387	5	2	113	35
<i>Ophioctis simplex</i>	1						1										1		5			
<i>Ophyotrocha</i> sp.	20							13	1									1		36	18	3
Phoronida unid.	209	1	2	6	1	10	1	1		55	42				1		2	36	18	3	22	8
Porifera unid. a	3	1		1				1														
<i>Pseudoceros</i> sp.	1		1																			
<i>Vitrinella</i> sp.	1										1											
Total:	12,917	395	372	176	201	110	250	6,171	341	328	338	149	161	68	54	665	1,303	1,028	159	76	393	179

**Table I6. Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPPTE003 (Replicate A), September 2003.**

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
<b><u>Annelida</u></b>											
Aoridae	4					4					
<i>Armandia brevis</i>	5	2			2					1	
<i>Brania mediodentata</i>	15	3	10			2					
<i>Capitella capitata</i>	29	1		7	10	6	1	2	1		1
Cirratulidae	1		1								
<i>Cirriformia moorei</i>	8								8		
<i>Cirriformia</i> spp.	1		1								
<i>Dipolydora socialis</i>	26						1	6	17	1	1
<i>Eteone aestuarina</i>	3	1	1		1						
<i>Exogone</i> sp. 1	6	2	3						1		
<i>Fabricinuda limnicola</i>	265	69	3	1	9	182		1			
<i>Marpysa</i> nr. <i>sanguinea</i>	9						2	1	4	2	
<i>Marpysa</i> sp.	4							1	3		
<i>Mediomastus</i> sp.	46		2	2		38	2		2		
<i>Megalomma pigmentum</i>	2								1		1
<i>Neanthes acuminata</i> complex.	10	9			1						
<i>Neanthes</i> sp.	3							2	1		
<i>Odontosyllis phosphorea</i>	1				1						
<i>Prionospio heterobranchia</i>	6				2	4					
<i>Pseudopolydora paucibranchiata</i>	1									1	
<i>Scolelepis</i> sp.	1									1	
<i>Scoletoma</i> sp. A	1		1								
<i>Scoloplos acmeceps</i>	23	10		2	5	4					2
<i>Streblospio benedicti</i>	6	2						1	1		2
<b><u>Arthropoda</u></b>											
<i>Acuminodeutopus heteruropus</i>	49	5	20			24					
Amphipoda unid.	10					7				2	1
<i>Ampithoe</i> cf. <i>plumulosa</i>	1			1							
<i>Corophium</i> sp.	56	35	4	2			2	1	2		10
<i>Erichthonius brasiliensis</i>	3					3					
<i>Euphilomedes carcarodonta</i>	109	13	29	2	8	57					
<i>Grandidierella japonica</i>	55	3	6		2	18	1		25		
<i>Hyale</i> sp.	1	1									
<i>Leptochelia dubia</i>	752	154	263	5	243	21				1	65
Leptocheliidae	71	20	35		11	2					3
<i>Mayerella acanthopoda</i>	22	8	4		1	9					
<i>Paracerceis sculpta</i>	5	2	1	1	1						
<i>Paranthuria elegans</i>	1	1									
<i>Parasterope bamesi</i>	87	25		1	5	56					
<i>Podocerus</i> spp.	14	13		1							
<i>Rudilemboides stenopropodus</i>	1	1									
<i>Rutiderma judayi</i>	36	1	3		7	25					
<i>Rutiderma lomae</i>	6				4	2					
<i>Rutiderma rostratum</i>	3				3						
<i>Rutiderma</i> sp.	6					6					

(continued)

**Table I6 (continued). Benthic invertebrate counts at intertidal stations in south San Diego Bay Survey SBPPTE003 (Replicate A) September 2003.**

Taxon	Total Count	IR1	IR2	IR3	IR4	IR5	IT1	IT2	IT3	IT4	IT5
<b>Molluscs</b>											
<i>Acteocina inculta</i>	187					7	136	6	20	10	8
<i>Barleeria</i> sp./ <i>Assiminea californica</i>	25				25						
<i>Caecum californicum</i>	3			2					1		
<i>Cecina</i> sp.	1								1		
<i>Chione californiensis</i>	8						2		3	2	1
<i>Musculista senhousia</i>	16	1	1		3	1				10	
<i>Solen rostriformis</i>	1				1						
<i>Tagelus subteres</i>	41	7	2	1	1		15	6	5		4
<i>Tellina meropsis</i>	73	16	2	2	10	4	11	6	8	9	5
<b>Other Taxa</b>											
<i>Diadumene</i> spp.	3									3	
Nematoda	125	16	60	16	10	12	3	4	1	1	2
Oligochaeta	96	27	34	1		4	2	3	20		5
Phoronida unid.	17	2			1	1		13			
Total:	2,360	450	486	47	367	499	178	51	126	43	113

# **Appendix J**

## **Fish Monitoring Data**

**Table J1.** List of Fish Species Observed in SBPP Discharge Channel (Summer 2003).

Common Name	Scientific Name	Sampling 1 (27Aug03)	Sampling 2 (12Sept03)	Sampling 3 (29Sept03)
Bat ray	<i>Myliobatis californica</i>		X	X
Round stingray	<i>Urolophus halleri</i>	X	X	X
California butterfly ray	<i>Gymnura marmorata</i>			X
Bonefish	<i>Albula vulpes</i>			X
Slough anchovy	<i>Anchoa delicatissima</i>	X	X	X
Deepbody anchovy	<i>Anchoa compressa</i>	X	X	X
California needlefish	<i>Strongylura exilis</i>			
California halfbeak	<i>Hyporhamphus rosae</i>	X	X	X
California killifish	<i>Fundulus parvipinnis</i>	X	X	
Topsmelt	<i>Atherinops affinis</i>	X	X	X
Bay pipefish	<i>Syngnathus leptorhynchus</i>	X	X	X
Barred pipefish	<i>Syngnathus auliscus</i>	X	X	
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>			X
Queenfish	<i>Seriphus politus</i>	X	X	X
Shortfin corvina	<i>Cynoscion parvipinnis</i>	X		
Striped mullet	<i>Mugil cephalus</i>	X		
Yellowfin goby	<i>Acanthogobius flavimanus</i>	X	X	X
Cheekspot goby	<i>Ilypnus gilberti</i>	X	X	X
Arrow goby	<i>Clevelandia ios</i>	X	X	X
Shadow goby	<i>Quietula y-caudia</i>		X	
Diamond turbot	<i>Hypsopsetta guttulata</i>	X	X	X
<b>SPECIES COUNT PER SAMPLING INTERVAL</b>		<b>15</b>	<b>15</b>	<b>15</b>
<b>ACCUMULATED SPECIES COUNT</b>		<b>15</b>	<b>17</b>	<b>20</b>

**Table J2.** List of Fish Species Observed in Sweetwater River (Summer 2003).

Common Name	Scientific Name	Sampling 1 (27Aug03)	Sampling 2 (12Sept03)	Sampling 3 (29Sept03)
Bat ray	<i>Myliobatis californica</i>			
Round stingray	<i>Urolophus halleri</i>	X	X	X
California butterfly ray	<i>Gymnura marmorata</i>			
Bonefish	<i>Albula vulpes</i>			
Slough anchovy	<i>Anchoa delicatissima</i>	X	X	X
Deepbody anchovy	<i>Anchoa compressa</i>		X	
California needlefish	<i>Strongylura exilis</i>		X	
California halfbeak	<i>Hyporhamphus rosae</i>	X	X	X
California killifish	<i>Fundulus parvipinnis</i>	X		
Topsmelt	<i>Atherinops affinis</i>	X	X	X
Bay pipefish	<i>Syngnathus leptorhynchus</i>		X	X
Barred pipefish	<i>Syngnathus aulicus</i>	X		
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>	X	X	X
Queenfish	<i>Seriphus politus</i>			
Shortfin corvina	<i>Cynoscion parvipinnis</i>	X	X	
Striped mullet	<i>Mugil cephalus</i>			
Yellowfin goby	<i>Acanthogobius flavimanus</i>	X		X
Cheekspot goby	<i>Ilypnus gilberti</i>	X		
Arrow goby	<i>Clevelandia ios</i>	X		
Shadow goby	<i>Quietula y-caudia</i>			
Diamond turbot	<i>Hypsopsetta guttulata</i>			
<b>SPECIES COUNT PER SAMPLING INTERVAL</b>		<b>11</b>	<b>9</b>	<b>7</b>
<b>ACCUMULATED SPECIES COUNT</b>		<b>11</b>	<b>14</b>	<b>14</b>

**Table J3.** List of Fish Species Observed in Long Term Studies at Reference Sites

Common Name	Scientific Name	SBPP Discharge Channel '97-'00*	South San Diego Bay '94-'97 **	Aqua Hedionda '94-'95***	Anaheim Bay '90-'95†	Batiquitos Lagoon '97-'01 ‡‡
Gray smoothhound	<i>Mustelus californicus</i>	X	X	X	X	X
Brown smoothhound	<i>Mustelus henlei</i>				X	
Leopard shark	<i>Triakis semifasciata</i>				X	
Shovelnose guitarfish	<i>Rhinobatos productus</i>	X				X
Bat ray	<i>Myliobatis californica</i>	X	X			X
Round stingray	<i>Urolophus halleri</i>	X	X		X	X
California butterfly ray	<i>Gymnura marmorata</i>	X		X		X
Diamond stingray	<i>Dasyatis dipterura</i>	X				
Bonefish	<i>Albulus vulpes</i>	X	X			X
Pacific worm eel	<i>Myrophis vafer</i>					X
Threadfin shad	<i>Dorosoma petenense</i>	X				X
Pacific herring	<i>Clupea harengus</i>				X	X
Pacific sardine	<i>Sardinops sagax</i>	X	X		X	X
Northern anchovy	<i>Engraulis mordax</i>	X	X	X	X	X
Slough anchovy	<i>Anchoa delicatissima</i>	X	X		X	X
Deepbody anchovy	<i>Anchoa compressa</i>	X	X	X	X	X
California lizardfish	<i>Synodus luciocephalus</i>					
Specklefin midshipman	<i>Porichthys myriaster</i>	X	X		X	
Plainfin midshipman	<i>Porichthys notatus</i>					
California needlefish	<i>Strongylura exilis</i>	X	X			X
California halfbeak	<i>Hyporhamphus rosae</i>	X	X			
California killifish	<i>Fundulus parvipinnis</i>	X	X	X	X	X
Topsmelt	<i>Atherinops affinis</i>	X	X	X	X	X
Jacksmelt	<i>Atherinopsis californiensis</i>					
California grunion	<i>Lauresthes tenuis</i>				X	X
Snubnose pipefish	<i>Bryx arctos</i>			X		
Bay pipefish	<i>Syngnathus leptorhynchus</i>	X	X		X	X
Barred pipefish	<i>Syngnathus aulicus</i>	X	X	X	X	X
Barcheek pipefish	<i>Syngnathus exilis</i>					
Kelp pipefish	<i>Syngnathus californiensis</i>			X		
Pacific seahorse	<i>Hippocampus ingens</i>					
Spotted scorpionfish	<i>Scorpaena guttata</i>			X		
Staghorn sculpin	<i>Leptocottus armatus</i>	X	X	X	X	X
Spotted sand bass	<i>Paralabrax maculatofasciatus</i>	X	X		X	X
Barred sand bass	<i>Paralabrax nebulifer</i>	X	X	X		X
Kelp bass	<i>Paralabrax clathratus</i>			X		
Salema	<i>Xenistius californiensis</i>			X		X
Sargo	<i>Anisotremus davidsonii</i>				X	X
Bigscale goatfish	<i>Pseudupeneus grandisquamis</i>	X				
Lookdown	<i>Selene vomer</i>	X				
Queenfish	<i>Seriphus politus</i>			X	X	X
White seabass	<i>Atractoscion nobilis</i>	X	X		X	X
California corbina	<i>Menticirrhus undulatus</i>					X
White croaker	<i>Cynoglossus lineatus</i>				X	
Spotfin croaker	<i>Roncador stearnsii</i>	X	X			X

(Table continued)

**Table J3 (continued).** List of Fish Species Observed in Long Term Studies at Reference Sites

Yellowfin croaker	<i>Umbrina roncador</i>	X	X		X	X
Black croaker	<i>Cheilotrema saturnum</i>		X		X	
Shortfin corvina	<i>Cynoscion parvipinnis</i>	X				
Shiner surfperch	<i>Cymatogaster aggregata</i>	X	X	X		X
Striped mullet	<i>Mugil cephalus</i>	X	X		X	X
California barracuda	<i>Sphyraena argentea</i>				X	X
Blue bobo	<i>Polydactylus approximans</i>	X				
Bay blenny	<i>Hypsoblennius gentilis</i>		X			
Spotted kelpfish	<i>Gibbonsia eligans</i>		X			
Giant kelpfish	<i>Heterostichus rostratus</i>		X		X	
Longtail goby	<i>Gobionellus sagittula</i>	X				X
Lonjaw mudsucker	<i>Gillichthys mirabilis</i>	X	X	X	X	X
Bay goby	<i>Lepidogobius lepidus</i>					X
Yellowfin goby	<i>Acanthogobius flavimanus</i>	X	X	X	X	X
Checkspot goby	<i>Hypnus giberti</i>	X	X		X	X
Arrow goby	<i>Clevelandia ios</i>	X	X	X	X	X
Shadow goby	<i>Quietula y-caudia</i>	X	X	X	X	X
California halibut	<i>Paralichthys californicus</i>	X	X	X	X	X
Bigmouth sole	<i>Hippoglossina stromata</i>				X	
Fantail sole	<i>Xypterus hololepis</i>		X			
Spotted turbot	<i>Pleuronichthys ritteri</i>		X			
Diamond turbot	<i>Hypsopsetta guttulata</i>	X	X	X	X	X
TOTAL SPECIES COUNT		38	46	17	33	41

\* - SBPP Cooling Water Discharge Channel Fish Community Characterization Study, Merkel & Associates 2000

\*\* - Station 4 (South) from Fisheries Inventory and Utilization of San Diego Bay, 3rd Annual Report, CSU Northridge 1997

\*\*\*- East Inner Lagoon Station, from 1994 and 1995 Field Survey Report of the Ecological Resources of Agua Hedionda Lagoon, MEC Anaytical Systems 1995

+ - Case Road Station, from Anaheim Bay Biological Monitoring, MEC Anaytical Systems 1995

++ - Station 1 (east lagoon) from Long Term Monitoring and Pilot Vegetation for the Batiquitos Lagoon Enhancement Project, Merkel & Associates 2001

**Table J4.** Number of Species, Density, and Biomass, by replicate for purse seine and large seine combined

a) Number of Species

Period	Station	Sampling Replicate		
		Inner	Middle	Outer
Sampling 1 (27Aug03)	SPBB Discharge	8	14	11
	Sweetwater River	7	5	8
Sampling 2 (12Sept 03)	SPBB Discharge	7	13	9
	Sweetwater River	7	5	6
Sampling 3 (29Sept03)	SPBB Discharge	10	11	8
	Sweetwater River	6	5	4

b) Density (individuals/m<sup>2</sup>)

Period	Station	Sampling Replicate		
		Inner	Middle	Outer
Sampling 1 (27Aug03)	SPBB Discharge	6.1	7.6	7.4
	Sweetwater River	1.3	0.5	0.6
Sampling 2 (12Sept 03)	SPBB Discharge	2.6	1.4	2.3
	Sweetwater River	0.9	0.6	0.8
Sampling 3 (29Sept03)	SPBB Discharge	7.9	8.4	1.5
	Sweetwater River	0.6	0.3	0.3

c) Biomass (g/m<sup>2</sup>)

Period	Station	Sampling Replicate		
		Inner	Middle	Outer
Sampling 1 (27Aug03)	SPBB Discharge	3.8	4	1.9
	Sweetwater River	4	1.1	3.8
Sampling 2 (12Sept 03)	SPBB Discharge	1.3	6.4	0.8
	Sweetwater River	4	2.7	4.8
Sampling 3 (29Sept03)	SPBB Discharge	50.4	5.6	0.5
	Sweetwater River	2.2	0.5	1.5